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THE
NATURAL HISTORY
OF
INSECTS,
WITH THEIR
PROPERTIES AND USES
IN
MEDICINE.

BY
R. BROOKES, M. D.

The SECOND EDITION, Corrected.

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INTRO.

INTRODUCTION

T O T H E

HISTORY OF INSECTS.

AMONG the various subjects, which Nature offers to the inspection of natural historians, no object whatever seems more to claim their attention than INSECTS. Though their minuteness may, at first view, seem a just argument for that contemptible idea, which the vulgar entertain of them—though the unthinking part of mankind may look on them as the result of chance, or as the refuse of nature—yet he that views them with due attention, and reflects on the art and mechanism of their structure, which collects such a number of vessels, fluids and movements, into one point, and that, too, frequently invisible to the naked eye, cannot but discover them to be the work of an all-wise Providence.

Those animals, which by their size chiefly attract our attention, are but the smallest part of animated nature; the whole earth swarms with living beings, every plant, every grain and leaf, supports the life of thousands. Vegetables seem, at first sight, to be the parts of organized nature, which are produced in the greatest abundance; but, upon minuter inspection, we shall find each supporting numberless minute creatures, who fill up the various gradations of youth, vigour, and old age, in the space of a few days existence.

Vegetables are generally produced but once in a season; but among insects, especially of the smaller kinds, a single summer suffices for several generations. These therefore would multiply in greater abundance than the plants on which they subsist, but that they are destroyed by other animals, and often by each other; the spider feeds on the fly, the birds upon the spiders,

and they, in turn, make the food of man, and of every beast of prey.

An insect is a small animal, either composed of several rings, joined together by a membrane, or of several small plates, which play one over another, or else having a body consisting of two or three parts, joined together by a sort of a thread or string. The first kind, we commonly call Worms or Grubs, as also Caterpillars. These humble animals move forward but slowly : when they advance from one place to another, they stretch the musculous skin, which separates the first ring from those that follow, and thrust it forwards to a certain distance ; then they contract and wrinkle the skin on the same side, bringing forwards the second ring, and so on.

The fibres of these rings are found to be spiral, as are their motions in a great measure ; so that by this means they can the better bore their passage into the earth. Their crawling motion may be explained by a wire wound round a walking-cane, which when slipt off, and attempted to be lengthened, has an elastic contraction of one ring to the other. In like manner the earth-worm, having shot out or extended its body, lays hold upon some substance with its small feet, and so brings onward the hinder part of its body.

Caterpillars have feet both before and behind, which not only enable them to move forward by a sort of steps, made by their fore and hinder parts, but also to climb up vegetables, and to stretch themselves out from the boughs and stalks to reach food at a distance. Behind, their broad palms are beset almost round with sharp small nails, to hold and grasp whatever they are upon ; likewise before, their feet are sharp and hooked, by which they can lay hold of leaves, while their hinder parts are brought up thereto. Reptiles that have many feet may be observed to move them regularly one after another, and from one end of the body to the other, in such a manner, that their legs in walking make a sort of undulation ; and by this means they move much swifter forward than one would imagine. The motion of snails is performed in a different manner : they have

have a broad skin along each side of the belly, that has an undulating motion, which, with the help of the slime that covers their bodies, they can move slowly forward, and adhere to every surface at pleasure.

The second sort of insects are flies of various kinds, whose bodies are covered by small plates, not unlike our ancient armour, the pieces of which are lengthened by unfolding, and shortened by running over each other. These lead a more luxurious life, transfer themselves from place to place with rapidity, and spend their little existence in feasting and propagating their kind.

The third sort are ants, spiders, and others, whose bodies are divided into two or three portions, joined by a sort of ligament. Of all the race of reptiles these seem to be endowed with the greatest share of sagacity. The wisdom of the ant is conspicuous in their forming themselves into a kind of little republic, and therein observing, if I may be allowed the expression, their own peculiar laws and policies; but the cunning of the spider seems to exceed that of most other insects: its various artifices to ensnare its prey, is no less remarkable than its contrivance of a cell or retreat behind its web, where it feasts upon its game with all the safety imaginable, and conceals the fragments of those carcasses which it has picked, without exposing to public view the least remains of its barbarity, which might distinguish its place of abode, or create the least jealousy in any insects, that their enemy was near them.

When we compare the elephant with the ant, how contemptible, at first view, does the latter appear? But, when we survey that little animal through a microscope, consider the art and mechanism of its structure, and discover the fluids circulating in vessels so small, as almost to escape the nicest observation, we are lost in wonder and astonishment, and are led to conclude, what a little difference there is between the great and the little things of this life.

Some insects are richly adorned with robes of various colours, as blue, green, red, gold and silver, and many other embellishments. We need only look upon shining flies, Cantharides, Butterflies and

Caterpillars, to be convinced of this truth. The same wisdom which has given them these ornaments, has armed them from head to foot, and has enabled them to fight, and to defend themselves. Though they do not always catch what they lie in wait for, or shun what is hurtful; yet they are provided with what will best serve them for those purposes. The common leech has strong teeth, the wasp and the bee have a powerful sting, and the snail, of one class, is covered with a strong shell, which is so hard as to defend it from external injuries, and so light as to enable it to carry it with it wherever it goes. The most delicate, such as Caterpillars, are furnished with hairs, which serve to break the shocks they may receive, and to weaken the blows, or to preserve them from the rubs that might hurt them. The generality of insects are quick in their flight, to get out of the way of danger; some by the help of their wings, of which there are numberless instances; and others, such as most of the inhabitants of trees, by the assistance of threads, which they can throw out, and hang by them under the leaves, on which they live. Others again, like the grasshopper, can leap to a great distance, and so get out of danger.

It is also wonderful to consider the various organs by which some insects are assisted to live, and the instruments they make use of, each according to their profession. The silk-worm is skilful in spinning, having two distaffs and fingers to draw out the thread; the spider can make nets and webs, and is therefore provided by nature with implements for that purpose; the wasp, by means of two small saws, which hang one on each side his mouth, procures from the rails and posts, which he meets with in the fields and elsewhere, such wood as is necessary in the erection of their common habitation; bees have scrapers, spoons, and trowels, if I may be allowed to give them those names, which they use in the formation of their combs, and for other purposes: the trunk of this little animal is more wonderful than that of the elephant; for this uses his only for his own convenience, but the trunk of the bee extracts the healing balsam even from poisonous herbs,

if

if we may credit the writings of some highly-esteemed authors : the method in which they perform this operation is beyond human comprehension, for all the art of man has never yet been able to extract liquor from plants with that skill. Let not the youthful part of our readers, while they pride themselves in human accomplishments, think too meanly of insects formed for their use, since nature has bestowed on the very lowest of them, something which it has denied to mankind.

The structure of the eye in insects is remarkably different from that of other creatures in several respects. It is defended by its own hardness against external injuries, and its cornea, or outer coat, is all over divided into lenticular facets, and thro' the microscope appears as a beautiful piece of lattice work. Each hole in this is of such a nature, that when looked thro' every object seems inverted. This mechanism alone supplies the place of the crystalline humour, which is not to be found in insects. Spiders have generally eight eyes, and flies may be said to have as many as there are perforations in the cornea. Most creatures are obliged to turn their eyes different ways to behold objects ; but flies have them so contrived, as to take in every object near them at once. In order to keep their eyes clean, they are provided with two antennæ, or feelers. Some however are of opinion, that they clean their eyes with their fore legs, as well as the feelers ; nor is this conjecture ill founded, when we consider, that in some sorts, particularly the flesh-fly, the feelers are too short for this purpose, and therefore their legs alone can supply the defect.

The mechanism in the feet of insects deserves also our notice. Amphibious insects, such as water-beetles, which are sometimes obliged to live by land as well as water, have their hindmost legs made with commodious flat joints, having gristles on each side serving for oars to swim with, and placed at the extremity of the limb ; they are also supplied with wings, which they are enabled to make use of when occasion requires. In those insects whose motions are performed by leaping, such as the grasshopper and cricket, their thighs are strong and brawny ; those, on the con-

trary, which use their claws in perforating the earth, have such parts made with strength and sharpness, as in the wild bee, and the beetle. There are even some animals that convey themselves by methods to us unknown. Insects, which are generated in stagnant waters, are often found in new pits and ponds, and sometimes on the tops of houses and steeples. Spiders with their webs have been known to soar to a considerable height, having been seen above the highest steeple of *York Minster*. How these animals have been thus capable of conveying themselves from place to place is a phænomenon, for which we are unable to account. Some years ago, it was the method to give reasons for every appearance in nature; but as philosophy grows more mature, it becomes more cautious and diffident, nor blushes in many instances to avow its ignorance.

Those insects which are provided with wings have tendons, which distend and strengthen them; those which are provided with four, such as the *Ephemera* fly, use the outermost rather as cases to defend the internal wings than as instruments in flying. When the insect is at rest, the inner wings are generally gathered up in the manner we close a fan, nor is it without some efforts that the little animal can unfold them. Those, however, whose wings are not cased in this manner, such as moths and butterflies, have them defended with feathers; for that beautiful variety of colours, which we so much admire, appears, thro' a microscope, to be nothing more than different coloured plumage, as artfully placed as in the wings of birds, but too minute to be discerned by the naked eye. Such insects as have but two wings have two little balls, or poisers, joined to the body under the hinder part of each wing, that serve to keep them steady, and in some measure counteract the changes of the air, which might at every variation carry them in its current: If one of these poisers be cut off, the insect will soon fall to the ground; but if they are both cut, it will still fly, but yet in the direction of every breeze.

They are thus formed for motion, rather to provide sustenance than to avoid danger. As from their natural weakness they are the prey of every superior order

der of animals, they seem to find safety only in their minuteness or retirement ; but even with every precaution they furnish out a repast to swallows and other birds, who, while to us they seem sporting in the air, are then employed in procuring their necessary subsistence. The insect itself, however, is at the same time in pursuit of some inferior order of insects, for there are the same hostilities among the smallest as there are among the largest animals.

All sorts of insects are generated like larger animals, from eggs ; and these at first are enclosed in a single or double covering, which opens when the animal is old enough to pierce through. When the brood break the covering, at their coming into the world, these creatures are said to be viviparous ; as for instance, Millepedes, or Hog-lice. When the old ones bring forth the young in a covering, where they are to remain some time, like the silk-worm, they are said to be oviparous. All these insects, and indeed, all sorts of animals are brought into the world by one of these two ways ; and those of the oviparous kind, always lay their eggs in a proper place, where they are hatched by a certain degree of heat.

It was formerly the common opinion, that all sorts of insects proceeded from corruption ; but this has been long exploded, especially since the invention of microscopes. And indeed, it would be absurd to suppose, that these animals, which are perfect in their kind, should be the effect of chance. The motions of these creatures may seem to us without any design ; and yet, it is certain, that they tend to a certain end, even those of the smallest, as well as the largest. No insect abandons its eggs to chance ; for they are never mistaken in laying them in places where they may receive proper nourishment, as soon as they are hatched. The Caterpillars that feed upon cabbages, are never found upon willows, nor those of willows upon cabbages. The moth delights to be among curtains, woollen stuffs, or papers, but never upon plants, nor in mud, nor yet in corrupted aliments ; and yet the contrary happens to flies, who lay their eggs in flesh : and therefore it is plain, it is instinct, and not chance, that di-

rects their choice. That this does not arise from the corruption of the flesh is plain from experiment; since beef fresh killed, and put into an open vessel, covered over with a piece of silk, so thin as to let in the air, and yet thick enough to hinder the eggs of the fly from passing through it, will be found to produce no maggots. However, the flies being attracted by the smell, will come in crowds to the covering, and endeavour to enter in, and perhaps lay some of their eggs upon the silk, but they will penetrate no farther; from whence it is plain, that corruption produces nothing.

When some of these eggs are hatched, the young will appear in their perfect form, which they never change afterwards. Thus, snails come into the world with their houses on their backs, and continue always in the same shape, as well as that of the houses, for they grow in proportion to the animal itself. Such likewise are spiders, which proceed from their eggs completely formed, and change nothing afterwards but their sizes. But the greatest part of other insects pass through different states, and assume successively the figure of two or three animals, which have no resemblance to each other. From the egg of the gnat, of which we shall presently say something more, proceed divers animalcula, which pass through three different states. In the first place, they live in the water; then they change, from being aquatic creatures, to such as are amphibious, living sometimes in the air, and at others in the water; and, lastly, they are inhabitants of the air only.

Summer is the season of their pleasures: many of them never live above a single season, while the ephemera continues but a few hours. Such however as are more long-lived take the proper precautions to provide for their safety in winter, and fix upon the most convenient situations for spending that interval, and such as want food lay in the proper stores for subsistence. But the greatest number want no such necessary stock, for they sleep during the continuance of the winter. Some caterpillars, for instance, having fed during the summer,

summer, retire, at the approach of cold, to a place of safety, and there, by spinning a thread like a cobweb, hang themselves in some commodious place, covered with a factitious coat, which at once serves to keep them warm, and guard them from external injuries. Here they continue in this torpid state till the returning sun calls them to new life; they then expand new wings, become butterflies, and seem employed scarce in any other manner than that of reproducing their kinds. Thus we see among insects, those different offices of eating, sleeping, and generation, make different seasons in their lives. Were we to compare them with other animals, we should find, that while those pursue such pleasures by frequent returns, these experience each but once in their lives, and die.

There are some insects, however, which lay up provisions for the winter, of which the bee and the foreign ant are remarkable instances. The wasp, the hornet, and the wild bee, are not less assiduous in laying in a proper stock of food, and fitting up commodious apartments; but this is wholly for the sake of their young; for they forsake their nests in winter, leave their young furnished with every convenience, and retire themselves to other places, where, in all probability, they live without eating.

In general, all insects are equally careful for posterity, and find out proper places, wherein to lay their eggs, that, when they are hatched and produce young ones, there may be sufficient food to maintain them; whether they chuse trees, plants, or animal substances, still the nascent creature finds a bed, which at once supplies food and protection. The plumb and the pea, each seem to give birth to insects peculiarly formed for residing in them. The pear and apple produce a white moth; on the oak leaf are hatched several, of beautiful colours, white, green, yellow, brown, and variegated. The manner in which those insects lay their eggs is sufficiently curious; they wound the leaf half through, and then deposite their eggs in the little cavity. As the insect increases, its nidus, or bed, increases also, so that we often see the leaves of trees with round swellings on the surface, upon

opening of which we may discover numberless insects not yet come to maturity. On oak trees these nests appear like little buds, and are in fact only gems, or buds, which are encreased in thickness when they ought to have been pushed out in length. The insect thrusts one or more eggs into the very heart of the gem, which begins to be turgid in June, and but for this would have shot out in July. This egg soon becomes a maggot, that eats itself a small cell in the midst of the bud, the vegetation of which being thus obstructed, the sap designed to nourish it is diverted to the remaining parts of the bud, which are only scaly integuments, that by this means grow large, and become a covering to the case in which the insect lies. Not only the oak, but the willow, and some other trees and plants, have knobs thus formed, which generally grow in or near the rib of the leaf. Among these cases formed by insects, the Aleppo galls may be reckoned as the most useful, the insects of which, when come to maturity, gnaw their way out, as may be seen by the little holes in every nut. But all these are formed by the ichneumon kinds of flies, namely, of those kinds which are vulgarly called the blue-bottle fly.

Those kinds, however, which do not wound the leaf, take great pains to lay their eggs on the surface, in the exactest and most curious manner. When thus deposited, they are always fastened thereto with a glue, and constantly at the same end. Those which lay them in the waters, place them in beautiful rows, and generally in a sily substance, to prevent their being carried away with the motion of the water. Upon posts, and on the sides of windows in country villages, little round eggs have been seen resembling pearls, which produced small hairy caterpillars, and those like the rest are all laid in very regular order. The gnat, tho' so very small, is yet very curious in the manner of depositing her eggs, or spawn. It lays them on the water, but fixes them to some floating substance by means of a stalk, which prevents them from sinking. The eggs are contained in a sort of transparent jelly, and very neatly laid: when hatched by

by the warmth of the season, they sink to the bottom, where they become small maggots, stick to the stones, and provide themselves cases, or cells, which they creep into or get out of at pleasure, and thus continue till they take the usual change into that of a fly.

Most creeping insects are tinged with one principal colour, resembling either that of the leaves on which they subsist, or the branches to which they fasten; on these they march with great slowness, and by this artifice are confounded with what they subsist upon, so as to escape the birds, their rapacious and watchful enemies.

Those with feet, which are called Caterpillars, go of their own accord to search for food on the leaves of the tree, that is most suitable to their nature, which is the very same where the dams laid their eggs. Those grow very sensibly in a short time, and some of them throw off their old covering five or six times, and seem to grow young again, by having a new skin.

There are some insects of the caterpillar kind, that live only upon greens, and others that feed on nothing but wood. It is now generally believed, that there is another sort which are nourished even in stones themselves; however, it is more certain, there are many which never appear out of the water. There are reckoned no less than three hundred kinds of Caterpillars which are already known, and the curious are still making new discoveries: their shape, their colour, their inclinations, and their manner of living, distinguishes the several sorts from each other; and yet they are all perfect in their kind. However, they are all composed of several rings, which being either extended or contracted, enable them to carry their bodies wherever they have occasion to go. They have a certain number of feet with joints, and are armed with hooks, wherewith they fix themselves to the barks of trees, especially when they sleep, which is the time of their passing from one state to the other. Almost all of them have threads composed of a fluid gummy matter, which they get out of the leaves that supply them with food. When they perceive any danger of being carried off by birds, or crushed by the motions of the branches, they fix

themselves to the trees by means of this gum, which is made into threads through several openings of their bodies, which threads they unite with their paws, and form several into one, capable of supporting their own weight, and so are generally secure from danger.

All sorts of Caterpillars use a particular kind of nourishment, which they never change upon any account whatever; for though they live upon greens, each has its own plant, and will sooner die than feed upon any other, unless they are nearly of the same kind. Towards the end of the summer, when Caterpillars have sufficiently fed on the green leaves, then they leave off eating, and secure a retreat, where they are to undergo the succeeding changes. A few days are sufficient for some to perform this metamorphosis, while others continue months, and even years in their coffins. Some at this time hide themselves in the ground, and others get upon the roofs of houses, into the holes of walls, under the bark of trees, and even into the heart of the wood; others, again, wrap themselves up in threads and gum, and then rowling in the sand, make themselves a sort of stone coffins. Likewise, some reduce little bits of wood to powder, and with their gum make a covering in which they wrap themselves; and when it is quite formed, it is not much unlike an *Egyptian* mummy.

In this manner they pass through their middle state; which is called that of a *Nympha*, and from whence they soon after are changed into winged insects. When the time of their eruption from the integument approaches, they increase sensibly in bulk, and break open their prison, leaving their shell behind them. Heat promotes this eruption; for experience has proved, that they do not so soon quit it in cold seasons, or backward springs.

There are numberless other insects which are brought forth alive, such as the spider, and the snail produced with a shell, which encreases with its growth, and is never found to forsake it. These are never seen to change, but still continue growing: the spider, as it becomes older, has its legs longer, and if they be cut off like those of the lobster, they grow out afresh.

The

The snail, with age, acquires additional ringlets to its shell, and contains in itself both sexes. But there is an animal lately discovered, whose powers of generation are still more extraordinary than any thing hitherto taken notice of, and from the phenomena attending which, Mr. *Buffon* has ventured to affirm, that he still believes there may be such a thing as equivocal generation. The animal in question is called the Polypus, a small reptile found on aquatic plants, and in muddy ditches. This surprizing creature, though cut into ever so many parts, still continues to live in every division, and each, in less than three days, becomes in every respect a perfect Polypus, like that which was at first divided. This I think may be justly esteemed the lowest of animated beings, and scarce to be ranked above the sensitive plant, except by being endowed with a locomotive faculty, or a power of moving from one leaf to another. It is thus that Nature chuses to mix the kinds of being by imperceptible gradation, so that it becomes hard to determine where animals end, or vegetables begin. In this there are evident marks of her wisdom in filling up every chasm in the great scale of being, so that no possible existence may be wanting in her universal plan. Were we to ask, why these minute creatures, in general little regarded by man, except from the prejudice they are of to his labours, were formed in such great abundance, it would be no easy task to find a reply, For man's use they were not made, as they are allowed to be noxious to him; nor for the sustenance of other animals that may be of use to him, since the advantages of the latter cannot compensate for damage done by the former; perhaps the wisest answer would be, that every creature was formed for itself, and each allowed to seize as great a quantity of happiness from the universal stock, as it was able: thus each was formed to make the happiness of each; the weak of the strong, and the strong of the weak, but still every order found happiness in proportion to its abilities. Thus we shall find, that though man may be reciprocally useful to other animals, yet in some measure they were formed for his use, because he has been

endowed

endowed with every power of rendering them subservient, and enjoying their submission.

Having thus taken a general view of what we intend particularly to describe in the following pages of this volume, it remains only to admonish the youthful reader, not to consider those matters as dry, trifling, or tedious, which, if properly attended to, will enlarge his ideas of the infinity of creation, and inspire him with that just sense of gratitude, which is due to the great Author of the universe. If nature has given him a genius, that prompts him to admire the beauties of human mechanism, to what a pitch must his admiration and astonishment be raised, when he beholds only the wonders displayed in a common insect, which he, perhaps, before looked on with the utmost contempt and indifference! He will soon be induced to believe, that the most sumptuous and voluptuous dresses, which art has manufactured to add a lustre to pomp and power, fall infinitely short of that magnificent garb, which nature has bestowed on the beautiful butterfly. Into what history will he look, to find those people, who are governed by laws equal to what he will observe in the republic of Bees? From the indefatigable Ant he will learn lessons of frugality and industry; and by the cunning Spider he will be taught to guard against the artifices of those, who lay snares to catch the thoughtless and inexperienced. In short, he will here see the bosom of Nature laid open to his view, her wonderful operations explained, and the care she takes in the increase and preservation of the minutest parts of her works.

T H E
N A T U R A L H I S T O R Y
O F
I N S E C T S.



C H A P. I.

*Of Insects of the BEETLE kind, with Cases over the
Wings.*

THE BEETLE is a flying insect, with a case over its wings to defend them from danger, when it does not fly; though some would have these cases a different sort of wings, and therefore place them among four winged insects, but very improperly; for they seem to be designed by nature to preserve their wings from the hard bodies, they often meet with when they dig holes in the ground, or gnaw rotten wood with their teeth, to make themselves houses or nests. When they fly they fill the air with a humming noise, perhaps greater than that of any other insect. They have a great aversion to roses, whose smell they cannot bear, and some affirm it will kill them. They are naturally fond of ivy, and delight to get under its leaves. There are different sorts of Beetles, some being large with horns, and others small with none, and hence they have different names.

The

The ELEPHANT BEETLE is the largest of this kind hitherto known, and is found in *South-America*, particularly *Guiana* and *Surinam*, as well as about the river *Oroonoko*. It is of a black colour, and the whole body is covered with a very hard shell, full as thick and as strong as that of a small crab. Its length from the hinder part to the eyes is almost four inches, and from the same part to the end of the proboscis, or trunk, four inches and three quarters. The transverse diameter of the body is two inches and a quarter, and the breadth of each case for the wings is an inch and three tenths. The antennæ, or feelers, are quite horny, for which reason the trunk is moveable at its insertion into the head, and seems to supply the place of feelers. The feelers are eight tenths of an inch long, and terminate in points. The trunk is an inch and a quarter long, and turns upwards, making a crooked line terminating in two horns, each of which is near a quarter of an inch long; but they are not perforated at the end like the trunks of other insects. About four tenths of an inch above the head, on that side next the body, is a prominence or small horn, which, if the rest of the trunk were away, would cause this part to resemble the horn of a Rhinoceros. There is indeed a Beetle so called; but then the horn or trunk has no fork at the end, tho' the lower horn resembles this. The feet are all forked at the end, but not like lobsters claws.

The RHINOCEROS BEETLE is of several kinds, one of which was brought from the *East-Indies*; it is of a jet black colour, and has a horn growing on its nose which turns upwards; and about the middle of the belly there is another horn, which arises from a tubercle, and turns inwards. The whole body, from the end of the horn to the back part, is four inches long, and the breadth is almost two. It has also two horns on the head behind the snout, and there are six feet or legs forked at the ends. This has been just taken notice of, and differs chiefly from the Elephant-Beetle, in not having the horn on the snout forked at the end; besides which it has no horn on the belly. There is also another Rhinoceros-Beetle, which is com-

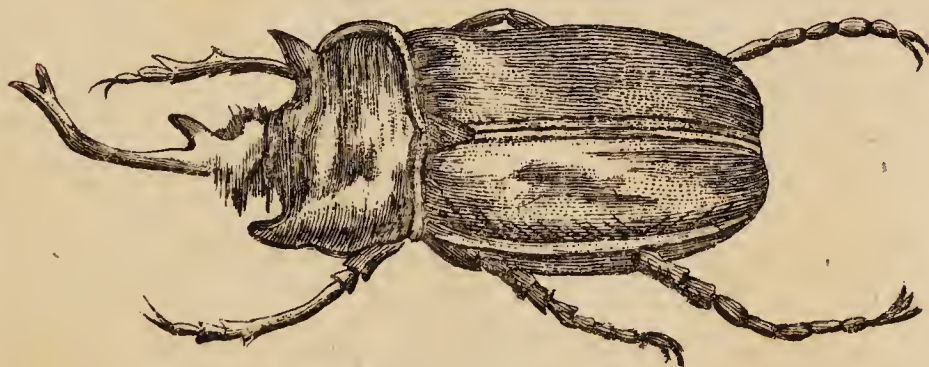
Rhinoceros-Beetle.



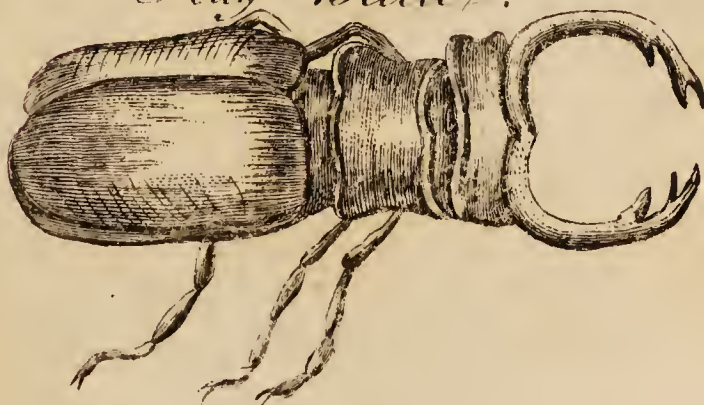
Elephant-Beetle.



Another Rhinoceros.



Stag-Beetle.



mon about *Vienna* in *Germany*. The horn has a greater resemblance to that of a *Rhinoceros*, for it turns up like it, and is sharp at the end; behind the head it has a prominent bump, and there are six feet as in the former. It is all over as black as pitch, except the belly, which is of a deep red. The horn of the nose is so very sharp, that it seems to be whetted to a point. The third and fourth kinds are much of the same shapes, only the wings of the former are longer than the cases, and in these they are shorter. They look as if they were covered over with shining-ink, and the horns on the head are full of knots. The head is of a greenish gold-colour, and the shoulders are red; but the belly is purple, and the cases of the wings are of the same colour as the head. The feet and legs are of a dun-colour, and the wings under the cases are whitish.

The **STAG-BEETLE** is of a dusky brown colour on the back, or rather blackish, especially about the cases of the wings and breast. It is above an inch long, and about half an inch broad, and has two horns without joints, but branched like those of a Stag, whence it has its name. When this Beetle is full grown it is as long as a man's little finger, and there are nippers at the end, with which this animal can pinch or lay hold of any thing, they being not unlike lobsters claws. The eyes are hard, prominent and whitish, and near them on both sides there are feelers, one pair of which are branched, and placed between the horns and the eyes, having each a joint which makes almost a right angle. The other pair are placed in the middle of the forehead, and are strait and flat, having each a tubercle like the head of a nail at the end. It has six feet, of which the foremost pair are longer and greater than the rest. The horns are sometimes as red as coral, which give this Beetle a very beautiful appearance; and the eggs when they are hatched turn into worms with six feet, which are afterwards changed into Beetles. It is very common in *Kent* and *Sussex*, and is sometimes seen in other parts of *England*.

The

The BEETLE *with lunatea, prominent, aentated jaws, and a smooth breast*, is of the larger kind, being an inch long, and two thirds of an inch broad. The thorax is smooth, convex and black, without any prominences, though it has a sort of an edge. The cases of the wings are smooth and of a blackish purple. The jaws are in the shape of a half-moon, and are prominent and black, having two teeth in each. It is found in hedges where there are ash-trees, for it feeds on the rotten part of their trunks, and burrows in the earth under their roots.

The BRASS BEETLE is of the larger kind, and has a short broad breast, the shape in general being considerably broad in proportion to its length; but the eyes are small, and the legs long and slender. The whole body, and outer part of the cases of the wings, are of a fine shining green, with a mixture of yellow. It is sometimes met with in our gardens.

The BEETLE *with clavated feelers, and the cases of the wings on the fore part*, is of the small kind, and of an oblong shape, with a black head and breast. The cases of the wings are grey towards the top, but elsewhere the colour is of a dusky blackish brown, with a transverse streak of white. This kind is common about the carcases of dead animals, particularly birds. Some would not have this to be properly a Beetle, but call it *Dermestes*.

The GREEN TORTOISE-BEETLE, *with clavated feelers divided into rings*, has a very small oval body, convex on the back, and flat on the belly. The upper part consists of the cases of the wings and the shield, which are both green and smooth, and appear to be one single crust, divided only by a kind of triangular future. The belly is black, and the head is entirely hid under the shield. The feelers are pale, only they are of a deeper colour on the top than elsewhere. The legs are of a pale brown, and there is a sort of a prominent rim running round the cases of the wings which entirely cover the body. It is common in gardens, and may be met with on mint and other herbs. These sort of Beetles are by *Linnaeus* called *Cassida*, from the shield.

The

Several Sorts of Beetles.



The BLACK CASSIDA, or Shield Beetle, *with feelers like bristles, and a roundish body*, is a very small Beetle, of a little longish shape, and of a dusky black colour. The cases of the wings are oblong, and lightly streaked with several very small hollowish spots. The shield is roundish, being somewhat broader than long, and is rough on the upper part, with a cruciated prominent edge. Sometimes there are two spots on the side towards the hinder part, with yellow hairs thereon. The belly is black, but in some lights has a gloss of a silver colour. It is met with in houses in the country, where it often does a great deal of mischief, eating holes in woollen cloths and stuffs. When it is touched ever so lightly, it draws up its head and wings under its body.

The *oval pale-clouded* CASSIDA, or Shield-Beetle, *with an undivided shield that covers the head*, is very small, and has a body of an oval shape, and of a pale brown colour, spotted and clouded all over with one that is more dusky, which makes it look somewhat like the shell of a tortoise. The shield is in the shape of a half-moon, and of a pale colour without spots; but the cases of the wings are streaked and speckled, and the streaks run in crooked lines. The body is black, and the feelers are black and slender. It may be easily found in beds of baum or mint.

The LADY-COW, *with reddish cases for their wings, and seven black spots thereon*, is an insect well known even to children, and has a black head with two white spots on the forehead, and a black breast, which is whitish near the edges. The cases of the wings are of an orange-colour; there are three black spots towards the base of each, and one that is common to both, which with the former makes seven in all. The feelers are very small and clavated; and the under part of this insect is black.

The LADY-COW, *with red cases for the wings, and two black spots thereon*, that is one on each, has its breast black, only there is one large white spot on its side, and two very small ones near the base; as also two others of the same size at the insertions of the feelers.

feelers. The belly and legs are black, as are the feelers likewise; and it is common to be met with on alder and other trees, as the former is among hedges in the summer time.

The LADY-COW, *with black cases for the wings, with four red spots thereon*, that is two on each case, has its breast entirely black, and the spots on the cases of the wings are of a blood-red colour; but that which is nearest the breast on each is largest. They are met with on maple trees in the North parts of *England*, and are sometimes seen, though but seldom, in the hedges near *London*.

The BLACK DERMESTES, *with a white spot on each of the cases of the wings*, is of the small kind, and has a body of an oval shape, which is black as well as its legs and feelers; on each of the cases of the wings there is a remarkable white spot, with five others so small that they are hardly visible. This animal when touched, or terrified with a noise, will stop and draw its head and legs under the shell of the body. It is common about some houses and old walls, and more particularly in places where victuals are kept.

The DERMESTES, *of a cylindrical shape, with a thick hairy neck, and testaceous cases for the wings*, is also of the small kind, and the body is of the shape of a cylinder, with a thick roundish black hairy neck. The cases of the wings are longish, blunt at the point, and like shells with a black edge or margin running all round them, but the colour of the cases themselves are of a whitish brown, and the body and legs are black. The antennæ or feelers are reddish; the size is not much bigger than a large louse, and when it is touched or terrified it contracts itself and lies quite still. It is very common in houses. There is another sort of insects of the Beetle kind, with slender feelers like threads, though a little thicker near the ends. This sort, as well as the former, is by some of our best authors placed among the Beetles.

The CHRYSOMELA is of the Beetle kind, and the feelers are in the shape of necklaces of beads, but thickest towards the extremities. The body is
nearly

nearly of an oval shape, and the breast is oblong and roundish. 1. The *blew-green* CHRYSOMELA is one of the largest sort of this kind, though they are all but small. The head is little, the legs slender, and the belly smooth. The back is roundish or convex, and the colour is a mixture of blue and green, with a very fine tincture of gold colour diffused throughout. The edges of the cases of the wings are a little prominent, and they are marked with a few hollowish small spots all the way round. The feelers, legs and belly, are entirely green. It is common in the meadows in *May* and *June*.

2. The CHRYSOMELA, *with a breast and the cases of the wings of a red colour*, is smaller than the former, and not so convex on the back. The head is small and black, as well as the body, legs, lower part of the breast and feelers; but the upper part of the breast is red, as are also the cases of the wings. It is commonly met with on some sort of willow-trees in *June* and *July*.

3. The *blue-green* CHRYSOMELA, *with a red breast and thighs*, is of the small kind, and the head and cases of the wings are of a beautiful shining green, with a blueish cast. There are a few hollow spots on the head, and the breast is small, convex, and of a reddish colour, with a cast of blue-green. The upper part of the legs is reddish and the other black, as well as the feelers. It is common in most parts of this kingdom.

4. The *Black* CHRYSOMELA, *with hollowed points*, is one of the largest of the kind, and is all over black, and the breast and cases of the wings are marked with small hollow points very near each other. The wings are flexible, soft, and blunt, and the feelers consist of twelve joints. They creep but slowly, and are found in quarries.

5. The *black smooth* CHRYSOMELA, *with the base of the feelers yellowish*, is of a middle size, and the joints of its wings are neither hollow nor streaked, but the black colour of this insect has a blueish cast.

6. The

6. The *purplish black* CHRYSOMELA, *with hollow streaked points*, is found upon the birch tree, and feeds upon its leaves. This insect is of a blackish blue inclining to purple, or rather of a violet-colour; but the belly feet and feelers are black, and the head and breast are marked with very small hollow points without order. The cases of the wings are streaked, and the eyes are hardly to be perceived.

7. The *purplish black* CHRYSOMELA, *sprinkled with hollow points*, is found in the Spring season on the alder-tree. It is like the former, only it is larger, and the cases of the wings are marked with hollow points, dispersed here and there, but not streaked.

8. The *purplish black* CHRYSOMELA, *with the breast yellow on each side*, is found upon the willow tree, and is of the size and shape of the former; it is entirely of the same colour, only the breast is red on the sides, round in the middle, and of a violet-colour; but a little blacker on the center. The head and lower belly are black, and there is a black point in the middle of the red that is on the sides of the breast.

9. The *green shining* CHRYSOMELA, *with a smooth breast, and the cases of the wings marked with hollow points*, is also found upon the willow, and is of a bright green colour. It is marked with hollow points that touch each other, and is blunt towards the vent. It seems to open the cases of the wings with trouble, and the breast is smooth, being but a little marked with points, and the feelers and feet are black.

10. The *green shining* CHRYSOMELA, *with the breast hollow before*, has not the breast equally hollowed, but only at the top.

11. The *green shining* CHRYSOMELA, *with a level breast*, is less than the former, but rounder.

12. The CHRYSOMELA, *that is a little testaceous*, is found in the beginning of the Spring among rotten wood, and is placed by authors among the largest kind. The colour of the whole body, which is oval, is chestnut, but the eyes are black, and the feelers and the feet red. The under parts of the feet are white,

white, and the cases of the wings are marked with hollow points.

13. The *pale green* CHRYSOMELA is found upon willow trees, and resembles the former, only it is a little smaller; but what distinguishes this from that is the pale colour, and the nine rows of points on each case of the wings, placed long ways. The eyes are black, and the bottom of the feet white.

14. The *Red* CHRYSOMELA, *with a cylindraceous breast*, is found upon the flower de luce. It is of a middle size, and its breast, the cases of the wings, and the top of the head are red; but the feelers, eyes, knees, belly, breast-plate, and under part of the head are black. The breast is much narrower than the cases of the wings, and is hollow on each side. The cases of the wings are marked with hollow points of a middle size.

15. The *Copper-coloured* CHRYSOMELA is very common on willows, and is of a middle size. It is of the colour of red copper when polished.

16. The *blackish blue* CHRYSOMELA, *with red cases of the wings*, is found on the poplar tree, in the beginning of spring, whose leaves it feeds upon. It is one of the largest sort; its red wings are marked with small points, and the extremity of each case of the wings has a black spot; the breast is smooth and of a green and black colour, as well as the corslet, belly, and feet; but the feelers are black. The cases of the wings of this kind are not plates or leaves, but seem to be made up of eleven joints, of which the last is largest. It throws out an oily fluid when touched, and stinks so abominably, that few are able to bear it.

17. The CHRYSOMELA, *with a red cylindraceous breast, and red cases for the wings*, is found on the branches of asparagus, and devours the stalks. It is but small, and has a head of a blackish blue, with black feelers, and the breast narrow and cylindric, marked behind with two black points. The cases of the wings are oblong, yellow, and of a fallow colour on the external edge; there is also a blue spot like a cross on the cases of the wings.

18. The

18. The *CHRYSOMELA*, with a green breast, and red cases of the wings, marked with a blue cross, is in shape much like that of the poplar tree, and the colour of the head and breast is that of green copper, with black feelers, and the feet are generally black. The head, breast, and cases of the wings, are of a singular beauty, and painted with copper-coloured streaks, a little inclining to blue.

19. The *oblong black CHRYSOMELA*, with red cases of the wings marked with four black spots, is the very largest of this kind, and is of a rounder shape. There are two large spots on each case of the wings, the first of which is oval, but the other more short. The feelers are almost dentated, and the breast is short.

20. The *red CHRYSOMELA*, with each cases of the wings marked with five black spots, is found upon willow trees, and is one of the largest of this kind, having a black head with a red breast, black in the middle, and red cases of the wings, upon each of which there are five large black spots of an unequal size. The belly and the under part of the feet are black.

21. The *long dusky CHRYSOMELA*, with the letter S marked on the cases of the wings, has a grey breast with white hair, and the cases of the wings are of a greyish-brown, with a white spot of the size of a grain of caraway-seed, of the shape as above.

22. The *CHRYSOMELA*, with dusky wings that are livid on the back part, is no larger than a flea; the body is black, and the breast brown.

23. The *livid CHRYSOMELA*, with black eyes, is small, and of a pale livid colour.

24. The *CHRYSOMELA*, that is reddish on the upper part, with two black spots on the breast, and several on the cases of the wings, is found on the poplar tree, and is of a middle size, with a black head.

25. The *CHRYSOMELA*, of a blackish brass colour, with the edges of the cases of the wings yellow, is of a middle size, and has the external edge of the cases of the wings and the breast yellow; but the middle of the breast and head are of a blackish copper-colour. The

lower

lower part is quite black, as well as the feet, and the body is oblong.

26. The *blackish brass-coloured* CHRYSOMELA, with two yellow lines on the cases of the wings, has an oblong body. There is on the lateral edge of the breast, in the middle of each case of the wing, and on the external edge, a long line of yellow; the legs and the internal part of the thighs are also yellow, and the feelers are knotted.

27. The CHRYSOMELA, with a black breast, and red cases of the wings marked with a black spot, is of a middle size, and has a narrow oblong body, with the feelers, head, breast and belly black; but the wings are white, and the feelers smaller than in other kinds; the cases of the wings are of a bright red, furnished with eight streaks or upwards, consisting of hollow points, and the base on the points are black.

28. The *blueish-green* CHRYSOMELA, with a red breast and thighs, makes its nest in the galls of the willow-tree. The head and cases of the wings are shining, and of a blueish green, marked with hollow points. The breast is small, marked with a reddish green or reddish chestnut colour, and it is thick and convex. The feelers and the bottom of the feet are black.

29. The CHRYSOMELA, of a yellowish shell-colour, with short wings, is met with among flowers, and is of the size of a louse, with an oblong smooth body. The feelers are full of knots; but the cases of the wings are furrowed, and shorter than the two joints of the belly.

30. The *testaceous oblong* CHRYSOMELA, with accumulated cases of the wings, is found in trees, and is the least insect of this kind. It is of a chestnut-colour, with the feelers like threads, and pointed cases of the wings which cover the tail.

31. The *dusky* CHRYSOMELA, with a blackish head, is found on the windows in the spring, and is somewhat less than a flea. The body is oblong, and the feet are of a paler colour than the body, which is of a black chestnut colour, with a black head.

32. The CHRYSOMELA, with dusky cases of the wings, and a yellow edge, is of a middle size, with a brown head. The breast is yellowish, and the cases of the wings almost black; but the feet are yellow, and the feelers alternately black and yellow. The wings are brown with black veins, and the belly yellow marked with a broad black line.

The CURCULIO or WEEVEL, is a small insect not unlike a bug, which is found among corn, where-with it is nourished, and it eats all the inside, but leaves the bran behind. *Linnaeus* divides this species of insects into no less than thirty-three classes; but, as the variations are very trifling, we shall omit them, to leave room for matters more worthy our enquiry.

The FLYING-BEETLE of the *West-Indies*, called by the natives *Acudia*, is a shining insect, and is almost as big as a Wren. There are four shining spots like stars, two of which are near the eyes, and two under the wings. Some pretend, the natives, before the coming of the *Spaniards*, made use of these Beetles instead of candles.

There is an insect of the Beetle kind, known in *England* by the name of a MAY-BUG, and in some places by that of a DORR. It has two pair of wings, one of which may properly be called the cases, and the other the real wings. The cases are hard, and of a reddish brown, sprinkled with a whitish dust, which easily comes off. The legs and tail are whitish, but the rest of the body is brown, except a white and dentated line, wherewith each joint is marked on both sides the belly. It is thought that the females make holes in the earth with their tails for the sake of propagation, where they lay a number of eggs, which soon turn into small worms that are extremely prejudicial to the roots of corn and young plants. They are sometimes so numerous, as to do prodigious mischief; they continue so long in this state, that they are the more dangerous on that account; and it is said the hardest frost will not hurt them. Rooks and hogs are very fond of these worms, and devour vast numbers of them; hence the advantage of rookeries is very evident,

evident, as the inhabitants of the county of *Norfolk* have found to their cost ; for they lately took it in their heads to destroy them all, since which time they have been pestered with great numbers of these worms, which have destroyed the roots of the wheat to their very great damage. One farm in particular was so injured by them in the years 1750 and 1751, that the occupier was not able to pay his rent, which the landlord was not only content to lose, but likewise generously gave him money for the support of his family.

These MAY-BUGS are seen most frequently flying about in the evening ; for in the day-time they hide themselves in the leaves of several trees till sun-set, when they appear in great numbers, and often fly in the faces of passengers.

Moufet informs us, that in 1574 there fell such a great number of these insects into the *Severn*, that they stopt the wheels of the water-mills. This was on the 27th of *February*, but the larger sort do not appear till *May*. In *Ireland* they suffered so much by these insects, that they resolved to set fire to a wood of some miles extent, to prevent their communication with others at some distance. And indeed it is certain, that where there are few trees and many rocks, the inhabitants are least infested with them.

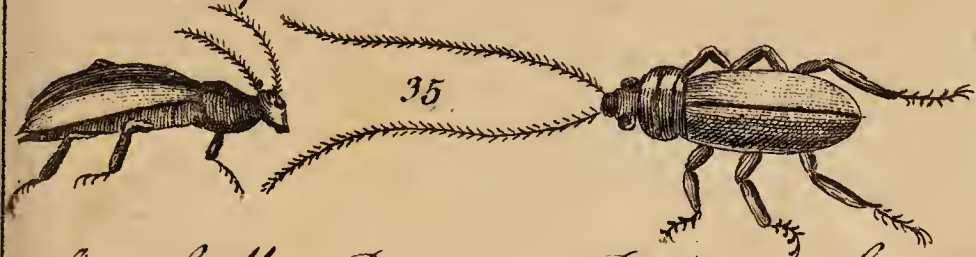
In some years their necks are covered with a red plate, and in others with one that is black ; but these are distinct sorts ; and some have observed that they do not appear in the same year, but alternately. *Ræsel* has been so curious as to catch some of these insects and put them under glasses, where they laid great numbers of eggs. They soon change to worms of a white colour, and at last increase to a considerable bulk. He kept them two years in this state, and some three, without any change, excepting their becoming larger. At this time they were an inch and a half long, and of a yellowish white colour. Their body consists of twelve segments or joints, as those of caterpillars, without including the head. On each side the body there is a protuberance that runs all along the segments ; in it there are nine holes, through which this worm is supposed to breathe. Under the

three first there are six feet, of a reddish brown, composed of four or five joints, and they are all alike hairy, and of the colour of the feet. The head is large in proportion to the body, and of a brownish shining yellow, with a pincher or nipper placed before, of a deep brown, and blunt, but dentated at the end; between these there is a sort of semicircular lip, and by the help thereof, this insect cuts the roots of plants and sucks out their moisture. There is no appearance of eyes, but behind the nipper there is a feeler, consisting of five joints, and of a brownish-yellow colour. This worm changes its skin once every year, and towards the end of the fourth year becomes a May-Bug.

The *American ball* BEETLE, called by the inhabitants Tumble-dung, is the most numerous and remarkable of the Beetle-kind of any in *North-America*. Their employment is to find nests for their eggs. They are endowed with sagacity to discover subsistence by their excellent smelling, which directs them in flights to excrements just fallen from man or beast, on which they instantly drop, and fall unanimously to work in forming round balls or pellets thereof, in the middle of which they lay an egg. These pellets, in *September*, they convey three feet deep in the earth, where they lye till the approach of spring, when the eggs are hatched, and burst their nests, and the insects find their way out of the earth. They assist each other with indefatigable industry in rolling these globular balls or pellets to the place where they are to be buried. This they perform with the breech foremost, by raising up their hinder part, and shoving along the ball with their hind feet. This insect is all over of a dusky black, and has six legs, two of which are joined to the breast, and four to the belly. They are always accompanied with other Beetles of a larger size, and of a more elegant structure and colour. The breast of these is covered with a shield of a crimson colour, shining like metal; the head is of the like colour, mixed with green, and on the crown of the head stands a shining black horn bended backwards. These are called the kings of these beetles,

but

Capricorn Beetles.



Sort of May Bug.



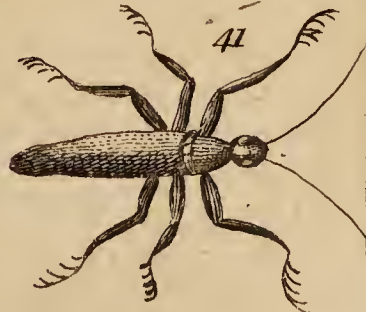
Ball Beetle.



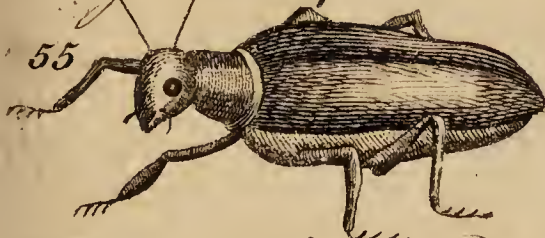
Green Chafer.



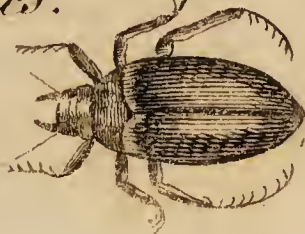
Small Beetle?



Green Chafer.



Small Beetles.



but for what reason is uncertain, since they partake of the same dirty drudgery with the rest. It is a very strong insect, for if one of them be put under a brass candlestick, it will cause it to move backwards and forwards as it were by an invisible hand, to the no small admiration of those who are not accustomed to the sight.

There is another insect, which at first appears to be of the Beetle-kind, to be met with in *South-America*, and particularly in *Surinam*. It is of a very heavy sluggish nature, and is furnished with a long tube or trunk under its nose, which it thrusts into flowers to suck out the honey. When it is preparing itself for transformation, it lies motionless for a considerable time, till at length the skin breaking on the back, there comes out a flying insect, with four wings that are transparent, and of a pale rose colour, veined with scarlet, and bordered all round with a pale yellow. The trunk of the body is much the same as in the Beetle state, though it entirely throws off its skin or shell, which was of a deep green colour. When it is transformed to a fly, it is exceeding swift, and makes a noise with its wings like a harp.

There have been the solid shells of a sort of Beetle brought to *England*, that were found on the eastern coast of *Africa*, over against part of the island of *Madagascar*, which the natives hang to their necks, and make use of them as whistles to call their cattle together. Their upper surface has the appearance of rough wings, which are so strongly united to those below after they are dead, that one would imagine they never could be made use of while they were alive. On their upper side they have above a dozen rows of round knobs, running lengthways, and between them there are others that are very small. The colour is black, spotted with red between each knot in the rows of the back, and they have also red spots on their under side. These Beetles, when living, will fly with great force against a person's head or face, though when they are dead they seem incapable of any such motion.

The GOAT-CHAFER, or CAPRICORN-BEETLE, is of the same size as the Stag-Beetle, as

also of the same colour. The head is broadish, and the eyes large, with a forked gaping mouth, and two exceeding hard crooked teeth, with which it is enabled to gnaw wood, at which times it makes a noise like the grunting of a pig. The shoulders are of a very curious structure, seeming to be carved, and having a lustre of the colour and polish of ebony. It has six legs, three of which are furnished with knees, that are weak, and scarcely able to support the body. It has two horns growing above the eyes, and longer than the body, consisting of ten flexible joints, not exactly round, but rough like those of a goat. It can turn them any way it pleases, only when it flies they are thrust directly forwards; and when it is weary with flying, they are used instead of feet. When it rests upon trees, it embraces a branch with its horns or feelers, and hangs thereto; insomuch that it looks not much unlike the bird of Paradise.

The *larger Capricorn green BEETLE*, *with the scent of musk*, is a very large beautiful insect, all over of a glossy lovely blue green colour, with a cast of a shining golden yellow. The body is blue on the upper part, and the wings under the case are black. The legs are of the same blueish green colour, only somewhat paler, and the breast is pointed at each extremity. Between these points there are three little tubercles near the wings, and three smaller towards the head. The cases of the wings are oblong, and somewhat in the shape of a lance, with three ribs a little raised and running longways. The feelers are nearly as long as the body, and are composed of many small joints, which grow smaller near the ends. It is sometimes found among old willow-trees, and has a sort of musky smell.

The *Russian Capricorn BEETLE*, *with very long horns*, is about three quarters of an inch long, and is all over grey. The cases of the wings are blunt, and furnished with many small hairs; and among them there are several small tubercles. A dusky blackish shade runs across the wings, which at the hinder part bends towards the middle. The breast is pointed at each end, and has four beautiful yellow spots towards
its

Capricorn Beetles



its hinder part. The eyes are black, and there is a black spot near the feelers, which are five times as long as the body. They are grey, and consist of ten joints, which are shorter the nearer they are to the head; but the wings are black streaked with brown. The female has an elongation at the vent, which renders the body one third of the length of the feelers. It is found among old wood, but is not very common with us.

The *black Capricorn* BEE TLE, *with a hairy grey breast*, has an oblong and somewhat depressed body, of a deep black, with a little mixture of grey. It is covered with many short hairs with prominent tubercles between them; but all the breast is hairy and black, though the hairs are white, which give it a greyish appearance; only on its hinder part there are two smooth prominent spots. The feelers are slender and black, and about half the length of the body, and there is an undulated line on the case of the wings, but so faint, that it is scarcely visible. It is found among timber, but is not very common with us.

There are several sorts of UNICORN BEETLES, which may be placed under two divisions; the first of which has sharp protuberances on the breast, and the second none. Of the first division, besides those already described, are the black Unicorn Beetle, with a flatted breast, and the edge of it having three teeth on each side, and the feelers are coal black. The reddish Unicorn Beetle with three black lines on the cases of the wings, running lengthways. The black Unicorn Beetle, with irregular pale spots on the cases of the wings, and a prickly breast; and has also feelers longer than the body. The grey Unicorn Beetle spotted with black, with a black transverse line on the cases of the wings, and the feelers longer than the body by one half. The grey Unicorn Beetle, with black cases of wings spotted with white, and a white transverse line on each, with feelers longer than the body by one half. The grey and black Unicorn Beetle, with the feelers about half the length of the body. The grey Capricorn Beetle, with two

yellow transverse lines on the cases of the wings, and the feelers half as long as the body. The shelly Capricorn Beetle, with a double white transverse line on each wing.

Of the second division, which has no protuberances on the breast, there are the black Capricorn Beetle, with two white undulated transverse lines on the cases of the wings. The shelly Capricorn Beetle, with a grey hairy breast, and two smooth short lines thereon. The shelly Capricorn Beetle, with a smooth breast. The brown Capricorn Beetle, with spots impressed on the breast. The grey Capricorn Beetle, with the cases of the wings spotted with black. The black Capricorn Beetle, with a longitudinal dentated yellow line and yellow spots on the cases of the wings. The shining violet-coloured Capricorn Beetle, with black feelers and clavated thighs.

Linnaeus has only four sorts in his *Systema Naturæ*, which are mentioned among those above.

The LEPTURA is a sort of a Beetle *with feelers like bristles, and the cases of the wings truncated at the points; as also a round breast.* The Tree-Beetle, or greater violet-red Leptura, is of the large kind, with an oblong-shaped body, smallest behind. The legs, feelers, and all the other parts, except the cases of the wings, are black, though in some lights they have a whitish cast. The cases of the wings of the female are of a deep red; but those of the males are not so deep, and are black or grey on the edges. All the surface of the cases of the wings in both is adorned with a multitude of small hollow dots, with a few short fine hairs. The head and breast are sometimes yellowish. It may be often met with in the woods, and *Ray* calls it a Unicorn Beetle, with the head, shoulders, and feelers black; but of a blackish yellow at the extremities.

The middle sized BEETLE, *with a black oblong narrow belly, and beautifully variegated with yellow lines and spots,* is of an oblong narrow shape. The general colour is of a blackish brown; only the upper edge of the breast is yellow, and there is a yellow spot where the cases of the wings join. Likewise there are
some

some undulated yellow lines running transversely thereon; they are truncated at the point, and are a little hairy, and the feelers and legs are of a reddish brown. It is not uncommon among the hedges in orchards and gardens.

The *yellow gold-coloured* LEPTURA, with black feelers, and dentated hinder legs, has an oblong body and small head. The colour resembles that of copper, with a mixture of fine strong gilded yellow variegations. The head, breast, and cases of the wings, as well as the legs, are all speckled with extremely minute, and almost contiguous hollow dots, which are irregularly dispersed over the breast, head, and legs; but on the wings they are pretty regular, and placed in ten rows, running lengthways, forming so many lines. The eyes are black, and the feelers brown.

The *violet-black* DUNG-BEETLE, called by Ray, the Greater Beetle, with an oblong body, of a purplish black colour, has a small head, and large prominent eyes, with pretty long, and very slender feelers. The general colour is black, only the edges of the breast and wings are of a deep beautiful glossy purple. The cases of the wings have neither dots nor lines, but they have a sort of wrinkles, which run longways, and others that cross them, which are not very visible. It is common on dung-hills, and among rotten vegetables.

The *purplish black* DUNGHILL-BEETLE, called by Ray the Unicorn Beetle, speckled with purple, is of the large kind, and the body is of an oblong shape, and pretty thick. The general colour is blackish, with a strong and very fine tinge of glossy purple. The cases of the wings are marked with three lines, each of which is formed by a row of about twelve longitudinal, hollow, round spots. The lines between them are hollowed. It is found in the same places as the former.

The *black* DUNG-BEETLE, with reddish legs, is a small species, being not much bigger than a common fly. The colour of the body is black, and the breast is broad and short. The cases of the wings are streaked each with eight lines, and the legs are of

a reddish brown, as are also the bases of the feelers. Some authors call it the Burn-Cow, or Burst-Cow, with a black body and red legs.

Linnaeus divides them into two species, namely, the greater or stinking Beetles, and the lesser or rapacious Beetles. Of the stinking Beetles, there are the black stinking Beetle with the cases of the wings convexly streaked. The black stinking Beetle with the cases of the wings greenish, and convexly speckled and streaked. The black stinking Beetle with brassy wings, convexly speckled and streaked. The black stinking Beetle with sixteen streaks on the cases of the wings. The green stinking Beetle with bluntly streaked cases of the wings, and the head and legs of an iron grey colour. The black stinking Beetle with green shallow furrowed wings, and black feelers and legs.

The MORDELLA is an insect of the Beetle kind, with feelers like threads, and have generally legs that serve them for leaping. It is called by the *Germans* Wasserwante; but we have no *English* name for it. The oblong Black Mordella, with a slender pointed tail, is not above a sixth part of an inch in length, and the breadth not half so much. The colour is black, and it is smooth and a little glossy on most part of the surface. The head is small and bent, and the cases of the wings have no streaks; the breast is smooth, and very convex, and the feelers are very slender, truncated, and jointed. The body grows gradually smaller towards the tail, where it terminates in a sharp thorn or prickle, which is black, and reaches longer than the extremity of the wings. The legs are slender and long, by which means it leaps very nimbly.

The *roundish opake black* MORDELLA is shorter and thicker than the former, being nearly of a roundish shape. The head is small, and the breast raised, being of a dusky deep black, but not glossy. The cases of the wings are of the same colour, and somewhat shorter than the body, but the legs are slender and long, which enable it to leap very briskly. It is common in gardens.

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The *shining blue oval-bodied MORDELLA*, called by Ray the *small leaping Capricorn Beetle*, is not much larger than a flea, and the body is short, being nearly of an oval form. The breast and back are both very convex and smooth, and of a very deep, beautiful, glossy blue colour. The legs are long, the thighs thick, robust, and whitish, and the lower part of the legs are of an iron-grey colour. It hops very nimbly, and is common among cabbages, while they are young.

The *roundish black MORDELLA*, with a *brassy tincture*, is much less than a flea, and is all over of a very deep glossy black, with a fine brassy yellowish cast. The belly and legs are of the same fine black, but without the yellow. The cases of the wings are marked with streaks, that consist of five small hollow spots. It may be seen in the gardens early in the spring.

The *CICINDELA* has *feelers like threads or bristles, prominent dentated jaws, and a roundish breast, though somewhat angular*. The Green Beetle with ten white spots of Ray is a Cicindela, and is a very beautiful insect; the upper surface of the body shining, and variegated with green and gold. The cases of the wings are smooth, glossy, of the same colour, and marked with ten white spots, some of which are roundish, some oblong, and one in the figure of a half moon; likewise the extremities of these cases are white. The breast is narrow, roundish, and of a deep green; the head is small, depressed, and finely tinged with gold. The eyes are black and prominent as well as the mouth, and the upper lip is blunt and white. The upper jaws are also prominent, and have several strong teeth therein; but the lower has only one tooth, and that at the extremity. There are two pair of feelers, one of which consists only of two joints, and the other of ten. The legs are very long and slender, and there is a kind of hard oval substance at the base of the thighs. It is common in pasture grounds in the spring, and runs and flies very swiftly.

The *small gilded BEETLE* is a small species, and its colour is fine and glossy, resembling a yellow metal

with a little mixture of green. The eyes are black and prominent, the breast narrow and rounded; and the cases of the wings are adorned with many broad hollow specks, in the center of each of which there is a prominent point. These hollow specks are placed in rows, and are a deep black; but their bottoms are of a fine metalline yellow. Upon the whole it is a very beautiful insect, and may be easily found on the banks of rivers.

The *CICINDELA*, *with the cases of the wings of a blueish green, and a yellow belly*, has a body nearly of an oval shape, and the head, breast, feelers and legs, are all black; the belly is of a yellowish tawny colour, and the cases of the wings of a blue-green, variegated with hollow specks. The feelers are slender, and consist of ten joints. This insect is common in the woods.

The *black CICINDELA*, *with the cases of the wings marked with six white spots, and a white streak*, is found in the woods, and runs and flies very swiftly. It is quite black, except the wings, marked as above, and the thighs and feet are long, slender, and a little hairy.

The *black CICINDELA*, *with a red breast, and blackish-blue cases of the wings* has black feelers, of the length of the body, and the head and feet are of the same colour; but the breast is of a reddish brown, and the cases of the wings black, with a blueish cast, marked with very small points. The belly is yellow behind, and oblong and narrow.

The *CICINDELA*, *with blueish cases of the wings, and the belly of a fallow colour*, is found at the bottoms of mountains, and in shady places, and is of the same shape as the former. The head, breast, feet, and feelers are black, and the belly, near the feet, is of a fallow colour; but the cases of the wings are of a shining blue, marked with hollow points, and the feelers consist of six joints.

The *CICINDELA*, *with a green breast, with the cases of the wings of an iron grey, but behind of a blueish black*, has black feelers, and the body and the breast of a shining blue.

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The GLOW-WORM is by *Dale* affirmed to be the female of the Cicindela, from the experience and examination of a physician in his neighbourhood. It has no wings at all, and is consequently a creeping insect. The shield and shape of the breast, as well as the folds and wrinkles of the body, plainly shew that she belongs to this kind. The body has eleven joints, or rather incisures, the first of which lies on the shield of the breast, and is of a half oval shape, flattened, marginated, and truncated at the hinder part. The head is placed under this, and is very small; and the three last joints of the body are of a yellowish colour, which shine or look like fire in the dark. It is often seen under hedges by travellers in the night, and if carefully taken up and laid upon a grassy turf, will continue to shine for several nights.

The BURN-COW, or BURST-COW, called in Latin *Buprestis*, is an insect *with feelers like threads or bristles, and the head half hid within its breast, and of a roundish shape.*

The yellowish-green BURN-COW, without spots, is placed by some among the Cantharides, only it has a more oblong body. The cases of the wings are of a greenish yellow, or rather of a gold colour; the legs are long and thickish, the eyes globous and prominent; and from the forehead near the eyes, there are two oblong horns or feelers, which are articulated. The head is small, the mouth wide, hard, strong, and forked, being armed with teeth, with which it bites very hard. The belly is not round, but longish. It will fight with Beetles and Efts, wounding them in the belly. It is about half an inch long, and feeds upon moss, heath, efts, worms, and other insects, which it vanquishes in fight, nor will it touch any that are killed by other means. *Belonius* describes it thus: it is a winged flying insect, having a most filthy smell, and is like a Cantharis, but larger, and is of a yellowish colour, and so very venomous, that horned cattle, which feed in pastures where they are, are often killed therewith. This however differs from the former in colour.

There

There is another BURN-COW, with a shorter body and a broader belly ; as also a sharper tail, and a small head, with prominent eyes, and a wide forked mouth. The cases of the wings are streaked lengthways, and the colour is as green as grass, with a mixture of shining gold. It has eight legs, which are long in proportion to the body ; but more slender than in the former species, and of a blackish colour ; the feelers are more small and slender, and it is as nimble as the first, but has a much more filthy smell. It lives upon flies and palmer-worms. These are venomous to cattle like the former ; and some affirm, if one of them be swallowed, it will poison a man.

In *Germany* there are also two other sorts, the one of a greenish gold-colour, and the other of a yellow black. The first is like the former above described, but is a little bigger, and the cases of the wings are streaked with lines of a deep gold colour, shaded with a little green ; and between the lines there are hollowish tubercles arise, which look as if they were engraved therein. It is very nimble, and in that is like the other kinds. The *yellowish-black* Burn-Cow has the same qualities as the former, only it is of a different colour, is a little bigger, and has four feelers.

The *brownish brassy* BURN-COW is a very small species, though the eyes are pretty large and prominent. The feelers are short, and the breast is short and broad, but hollowed, and has a very small rim. The cases of the wings are very bright and glossy, and finely streaked with very minute elegant specks. The legs are slender and black, as well as the under part of the body, and the snout is prominent. It is common among the reeds near rivers.

The *brassy and clouded* BURN-COW, with *clawed feelers*, is also a small species, being hardly so big as a flea. The belly and lowest part of the body are black ; but the upper is all over of a brassy yellow, with a mixture of brown, and it has a brown spot on the back, which touches both the cases of the wings, which are finely streaked. The breast is marked with five oblique furrows, and is large. The head is almost hid under the breast, and the body grows narrower towards

wards the tail. It does not appear that these two last species are dangerous to cattle.

The *Virginian* BURN-COW is of a dusky brassy colour, with spots on the wings, and is of a pretty large sort. The head is almost hid under the breast, as in the former kinds, and the breast is of a brassy colour, with a mixture of a reddish brown. The cases of the wings are also of the same colour, though they have not so much of the red; but they are marked with four or five streaks, and on each there are two spots, so disposed, as all together to make a square figure when the cases are closed. They are of a bright and clear yellow.

Linnaeus mentions the BUPRESTIS *with a forked mouth*, the greater water Buprestis, and the lesser water Buprestis.

WATER-BEETLES have generally feelers like bristles, and feet proper for swimming, being a little bearded like an ear of corn, and are six in number, the hinder being a little longer and broader than those before. They never fly in the day time, but in the night, or at least very seldom.

The *great* WATER-BEETLE is an inch and a half long, and is all over of a deep, somewhat glossy black. The eyes are pretty large, the feelers short, and the cases of the wings smooth on the surface, and under them there are wings, with a tincture of a silver colour. The body grows smaller, and terminates almost in a point behind it. It is very common in ponds and ditches, and feeds upon the smaller water insects.

The *black* WATER-BEETLE, *with the cases of the wings yellow on the edges*, is of the same size with the former; but the head is small in proportion to the body. The eyes are large, and the legs strong and robust; the edges of the cases of the wings are very prominent, especially about the middle, where they are of a yellow colour; but every other part is black. It is common in rivers and brooks.

The *goggle-eyed* WATER-BEETLE is not quite so large as the two preceding, but it has a big head, and the eyes are very prominent. The cases of the wings
are

are marked with ten streaks, which do not run through the whole length, for they are smooth near the end. The streaks are very deep, and the colour all over is of a blackish brown.

The *grey* WATER-BEETLE is not much bigger than the blue flesh-fly, and its breast is yellow in the middle, though black at the top and bottom. The cases of the wings are of a greyish colour, marked with a great number of shining yellowish specks, and at the edges they are entirely yellow. There is also a yellow spot in the shape of a heart, with black edges on the top. The point of the breast is blunt, though a little forked.

Linnaeus takes notice of the Water-Beetle with perfoliated feelers, of that with dilated sides, of the common Water-Beetle, and of the Water-flea. These last are remarkable for skipping up and down upon the water, as if they were at play; but when the water is troubled, they sink to the bottom, or hide themselves in the holes of the banks.

The other species are the Water-Beetle with a yellow breast, that with brown wings and a black belly. The Water-Beetle with a round body, marked with ten streaks on the cases of the wings. The oval bodied Water-Beetle, with the cases of the wings and breast black, but the head and legs reddish. The brown oval Water-Beetle with reddish legs, head, and breast.

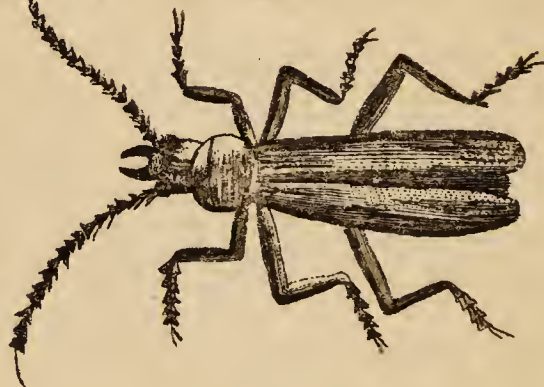
Another insect of the Beetle kind is by modern authors called ELATER, which has feelers like bristles, and an oblong body. It is remarkable, that when laid on its back, it has the power of springing or leaping up, whence it has its name; for Elater signifies a spring.

The ELATER of a mixed brown, green, and brassy colour, is a small species, and has an oblong body. The breast and cases of the wings of the male are very bright, abounding pretty much with green, and the feelers are a little pectinated on the sides. The colour of the female is more yellow, and the breast is broader and glossy, being more green than the wings,
but

Cantharides



Gadflies or Burncones



but the feelers are not pectinated. It makes its appearance chiefly in *June*.

The *black ELATER*, *with a red breast*, is of the smallest species, and is all over black, except on the breast and the cases of the wings, which are of a blueish cast; likewise the forepart of the breast is black, and the other red, and has the appearance of a large red spot, in the shape of a half-moon, the horns of which are turned towards the head. The feelers are black. It is very common in pasture-grounds, under hedges, near *London*.

The *brownish black ELATER* is a pretty large species, and has an oblong body. The colour is the same throughout, being of a brownish black; but the head is small, and the cases of the wings are smooth, and a little glossy. This is called the *brown NOTOPEDA* by *Linnaeus*; who also takes notice of the black Elater with a hairy breast; the black Elater with a red breast, mentioned above; and the black Elater with red cases of the wings. Other authors mention the greenish brass-coloured Elater, with yellow legs. The black Elater with the cases of the wings blue. The black Elater with the cases of the wings red on the back part. The black Elater with the cases of the wings livid on the outer edge. The red-breasted Elater with red cases of the wings. The black Elater with brown cases of the wings, and the feelers and legs of a reddish brown.

The *CANTHARIS* is of the beetle kind, from whence comes Cantharides, well known in the shops by the name of *Spanish flies*, and for their use in blisters. They have feelers like bristles, flexible cases of the wings, a breast pretty plain, and the sides of the belly wrinkled.

CANTHARIDES differ from each other in their size, shape and colour; those used in the shops also do the same. The largest in these parts are about an inch long, and as much in circumference; but others are not above three quarters of an inch. Some are of a pure azure colour, others of that of pure gold, and others again have a mixture of gold and azure colours;

colours ; but they are all very brilliant, and extremely beautiful.

There are four parts in this insect, namely the head, the neck or breast, the body, and the belly. The head is small in proportion, but the mouth is pretty large, and there are teeth in the jaws, with two sorts of articulated pinchers, with which they lay hold of the food and bring it to their mouth ; on the forehead there are two eyes of a golden colour, a little prominent, and under them there are two horns or feelers, made like bristles, pretty long, and moveable, by means of twelve equal articulations, the last of which terminates in a point. The top of the head, which rises in a bump, is extremely smooth and polished, and divided into two parts. Instead of a chin there is a beard, and the breast is formed of a single plate, behind which are a sort of lungs, and it is connected below to the first pair of feet, which are each composed of three parts, much of the same length, of which the last has five knotted joints, terminated with two crooked claws. The cases of the wings are membranous, connected to the breast, and as it were shagreened ; they are more long than broad, convex above, and hollow beneath ; they are thin, but strong, and cover the upper part of the body, to which the two last pair of feet are connected. The belly consists of six large rings, that are smooth and folded at the sides. They are seemingly without hair, but examined with a microscope they appear a little hairy, especially in the under part. The body, properly so called, is composed of eight moveable rings, which are furrowed from one end to the other. They are bred from worms shaped almost like real Caterpillars.

Aldrovandus assures us, that they are a salacious insect ; that the junction of the male and female lasts some time ; and that the female, upon these occasions, gets on the back of the male, which is contrary to the method in most other animals.

These insects are much more common in hot countries, than in cold, such as *Spain*, *Italy*, and the southern parts of *France* ; however, they are to be met with in all parts of *Europe*, at some seasons of the year.

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Linnaeus makes no mention of them in his account of the animals of *Sweden*; however, in another place he informs us, he has found them upon privet trees, and ash trees, in *Schonen*. According to *Lemery*, they are to be met with about *Paris*, in the summer time, as well as in other places, upon the leaves of the ash, the poplar, and the rose trees, and also among wheat, and in meadows. It is very certain, that these insects are fond of ash leaves, inasmuch, that they will sometimes strip one of these trees quite bare. Some affirm, that these flies delight in sweet smelling herbs, and it is very certain, that they are fond of honey-suckles, lilac, and wild cherry shrubs; but some that have sought after them, declare they never could find them on elder trees, nut trees, and among wheat.

These insects are very uncommon in *Germany*; yet we are told in the *German Ephemerides*, that in the month of *June*, in the year 1667, there were found about the town of *Heldebsiem*, such a great number of *Cantharides*, that all the willow trees were covered with them. Likewise that in *May*, 1685, when the sky was serene, and the weather mild, a great number of *Cantharides* were seen to settle upon a privet tree, and devoured all the leaves, but did not meddle with the flowers. We are also told, that the country people expect the return of these insects every seven years. It is very certain, that such a number of these insects have been together in the air, that they appeared like swarms of Bees; and that they have so disagreeable a smell, that it may be perceived a great way off, especially about sun-set, though they are not seen at that time. This bad smell is a guide for those, who make it their business to catch them: When they are caught, they dry them, after which they are so light, that 50 will hardly weigh a dram.

The *English* name of *CANTHARIDES* is *Spanish Flies*, and those that are dry, fresh, and whole, are the best. Those that gather them, tie them in a bag, or a piece of linen cloth, that has been well worn, and then they kill them with the vapours of hot vinegar;

negar; after which they dry them in the sun, and keep them in boxes.

These flies thus dried, being chemically analysed, yield a great deal of sharp, volatile, caustic salt, mixed with a little oil, phlegm and earth. Cantharides are penetrating, corrosive, and applied to the skin, raise blisters, from whence proceeds a great deal of serosity. They are made use of both inwardly and outwardly.

Many physicians have formerly looked upon Cantharides, taken inwardly, as a dangerous poison, and have absolutely forbid the use. Thus Dr. *Greenfield*, a practitioner in *London*, was sent to Newgate, by the college, for having given these insects inwardly. This happened in the year 1698; but he was soon after released, by a superior authority. However, he published a book, wherein he taught his accusers a new method of practice, which has been made use of, more or less, ever since; he having published undoubted certificates of their good effects, particularly in suppressions of urine, the stranguary, and other disorders of the kidneys and bladder. Inasmuch that they are so far from creating mortal ulcers, as was pretended, that when administered properly, they have proved a certain cure for ulcers of the bladder.

The physicians at *Paris* still forbid the use, on the abovementioned account, because they sometimes occasioned an evacuation of blood, by the urinary passages. However it is very certain, that the injudicious use of them has produced many dangerous symptoms, that have terminated in death. Thus we are told by *Ambrose Parry*, that a courtesan, having invited a young man to supper, had seasoned some of the dishes with the powder of Cantharides; which the very next day produced such an effect, that he died with an evacuation of blood, which the physicians were not able to stop. In the *German Ephemerides*, we are told of a physician, who was willing to try the effect of an aphrodisiac electuary, in which there were Cantharides: he took about the size of a chestnut; but he paid dear for his curiosity, for he was seized with the stranguary, attended with insupportable pains; however

however by drinking a potion, made with turpentine, syrup of poppies, and that of marshmallows, he had the good luck to escape. Many other instances might be brought, of persons that have been either killed, or brought to death's door, by a wonton use of these Flies, which had been given them privately, with a design to cause love. Some go so far as to affirm, that people have been thrown into a fever, only by sleeping under trees, on which were a great number of Cantharides. Mr. *Boyle* informs us, after authors worthy of credit, that some persons have felt considerable pains about the neck of the bladder, only by holding Cantharides in their hands.

As a remedy against the disorders, occasioned by these Flies, among people that gather them, they take frequent draughts of emulsions, during the time they are at this business. However it is somewhat strange, that the effects of these Flies should fall principally upon the urinary passages; for though some authors have endeavoured to account for this, we are still in the dark; for all they have said amounts to no more, than that they affect these parts, because they do affect them.

The remedies the physicians have recommended to cure the disorders created by them, are fallet oil, oil of sweet almonds, and milk, drank very plentifully. To these may be added, emulsions made with sweet almonds, or the cold seeds, and syrup of poppies, or marshmallows.

After all, it is very certain, that CANTHARIDES act by stimulating the vessels, and by dissolving viscosities, so as to augment the secretion of urine; for which reason, they are generally allowed to be good in those diseases, where this evacuation is looked upon as a means of healing them; and particularly in dropsies, and suppression of urine. But then they must be given in very small doses, and mixt with other remedies, proper to prevent their bad effects upon the bladder. And in these cases, experience has often shewn, that patients have been cured, after their lives have been given over.

Worlboufius was called to a patient, who had an intire fuppreffion of urine, and perceiving that the remedies which had been prefcribed were ufelefs, and fo far from doing any good, that his patient was continually delirious, with a twitching of the tendons, and cold fweats, together with a fwelling of the lower belly, and a weak, irregular, and frequent pulse, all which threatened immediate death; he then refolved to give a grain of Cantharides, in an emulfion, every four hours. And at the third dofe, the patient began to make water, which was a little grumous and bloody; that which followed was pituitous, and then it became clear, but was voided with difficulty. However this encouraged him to continue the medicine to the ninth dofe, and then the patient grew quite well in a fhort time. But thofe that would fee more particular accounts of the effects of Cantharides, fhould confult doctor *Greenfield's* treatife upon their internal ufe; and it is obfervable, he always made ufe of camphire, to prevent any bad confequences.

Hombreg, in the memoirs of the academy of fciences, affirms, he had made ufe of thefe infects, feveral times, with great fuccefs, againft diforders of the kidnies, and the gravel. He directed to take a dram of Cantharides, without their wings, and as much of fmall cardamom feeds. Thefe were to be powdered, and an ounce of rectified fpirit of wine, was to be poured thereon; after that, half an ounce of the fpirit of nitre. Thefe were to be left in cold infufion for five or fix days, fhaking the phial from time to time. The dofe is from four to fifteen or twenty drops, in a glafs of wine and water, every morning, drinking water-gruel about an hour after. This method is to be continued for three or four days. You muft obferve not to flop up the phial very clofe, becaufe the continual fermentation of the liquor would break it.

Many obfervations might be added, all which would tend to prove, that Cantharides are a fafe medicine, and excellent in many difeafes, notwithstanding the pretended poifonous quality they are faid to be endowed with. There is a great variety of opinions, regard-
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ing the internal use of these insects; some would have them powdered intire, and others after they were deprived of their head, feet, and wings. Some physicians think their use is safest, when their bad qualities are corrected; while others would have them given without any correction at all; and they all appeal to experience, in support of their opinions. However it is certainly best, to accompany their use with such things as will restrain their violent effects, at least they should be given in a very small dose; for there is seldom any bad consequence, except the patient is extremely delicate, or the dose is over large. For these reasons, physicians should always begin with a very small dose; as for instance, half a grain, and so increase it by degrees, as the case requires. It must be also observed, that their strength and activity are more or less, as they are fresh or old, for the newest are always most efficacious.

It is now universally known, that Cantharides are the basis of blistering plasters, by mixing their powder with some proper ointment; and their effects this way, is to stimulate the vessels, to dissolve the lymphæ, and other gross humours, which render them very proper in many kinds of fevers, in sleepy diseases, and in defluxions on the lungs, eyes, and ears; as also in fixed rheumatic pains, proceeding from the sharpness of the serum, which tears the fleshy and membranous fibres. They are likewise good in all cases, where the feeling of any part is lost, by carrying off the impurities out of the mass of blood. They are applied behind the ears, to the nape of the neck, to the shoulders, thighs and legs, according to the nature and place of the disease. But in all cases, where blisters are applied, it will be proper to give emulsions, to prevent a stranguary or heat of urine; for it is very well known to all practitioners, that blisters seldom fail of affecting the bladder.

The CANTHARIS, *with blackish cases of the wings, and a red breast*, is of the largest kind, being above an inch and a half long, and about a quarter of an inch in diameter. It is softer to the touch than most other insects of the Beetle kind, and has a flattish head.

head and back, except under the eyes, where it is a little reddish. The mouth is small and forked, and the feelers at the mouth are very short and small; but there are others half the length of the body, and consist of eleven joints, reddish near the root, and brown every where else. The breast is depressed behind, and is in the shape of a heart; but the edges are somewhat prominent, and the whole is reddish, except a black spot on the upper part, close to the head. The cases of the wings are plain, smooth, and oblong, but very soft and flexible, feeling like silk, and of a brownish black colour. The body is brown, except the last joint, which is reddish, and there is a tincture of the same colour along the sides, which are compressed all the way. The joints are folded in some sense over each other, and their extremities are soft, being covered with a sort of pimples. It is common about houses in the country, and under hedges.

The *red-breasted* CANTHARIS, *with red cases of the wings*, is a small sort, having a black body, and the cases of the wings of a bright elegant red, as well as the breast, only there is a black spot thereon. The feelers are slender, the cases of the wings very soft, silky, and flexible, and the wings are thin and brown. This is not very common with us.

The CANTHARIS, *with black cases of the wings marked with two red transverse lines*, is not much bigger than a louse, and the legs and feelers are black, but the head and breast of a greenish colour. The cases of the wings are of a deep glossy black, marked with two transverse red streaks, one of which is near the base, and the other near the point or extremity. The sides of the body are reddish. It is not uncommon under hedges and pasture grounds.

Linnaeus takes notice of ten sorts of CANTHARIDES; the first of which he calls the Female Cantharis, without wings, and it is usually found upon juniper trees. He says he has never yet seen the male, though he does not question but there is one, because this shines in the night time, as he thinks with an intent to let the male know where to find her. This is the same as the
Glow-

Glow-worm, and in some measure confirms what Dale has said about her.

2. The CANTHARIS, *with testaceous cases of the wings, and a red breast without spots*, is found in the same places as the former, and is of the same shape and size, resembling it in all things, except the colour of the cases of the wings, which are of a pale yellow; likewise the breast is without spots, and the eyes are black.

3. The CANTHARIS, *with black cases of the wings, and a red breast marked with a white spot*, is called the Tree-Beetle by some, and is of a blackish brown colour, with slender cases of the wings.

4. The CANTHARIS, *with red cases of the wings, and a red breast marked with a black spot*, is found in different places, and sometimes among heaps of iron ore. It is less by one half than the former, and the body is entirely black. The feelers are very slender, and the cases of the wings are of a deep red, or saffron colour, slightly streaked, but the wings themselves are brown.

5. The green copper-coloured CANTHARIS, *with the cases of the wings red on the outside*, is found on large nettles, and other plants; it is of a middle size, and has the head, breast, feelers, the rings of the belly, the lower part of the cases of the wings, and the inner edges, of a greenish copper-colour; but the hinder part of the cases of the wings near the point, as well as the sides, are red, and the remainder of a greenish copper-colour; but the wings themselves are brown.

6. The CANTHARIS *of a greenish copper-colour, with the point of the cases of the wings red*, is much smaller than the former, the wings are of a blackish brown, and the feelers quite black. The breast, head, and cases of the wings, are of a deep green, inclining to a copper-colour, with red or saffron coloured points. The belly is longer than the cases, and beneath is of a copper-colour; but the inside of the wings are red. This sort varies with regard to the cases of the wings, which are sometimes blue, and at other times red.

7. The CANTHARIS, *with black cases of the wings, marked with two red streaks*, is no larger than a louse. The head and the breast are green.

8. The CANTHARIS, *with black cases of the wings with yellow points, and a black breast*, is of the size of the former, but the head and the breast are quite black. The end of the cases of the wings is yellow, or of the colour of sulphur, and the sides of the belly are yellow.

9. The brown CANTHARIS, *with the cases of the wings yellow at the point, and a red breast*, is of the size of a louse, and the breast is of a rusty red, with a black spot; the cases of the wings are brown, and do not reach half way on the belly; but their points are yellow. The thighs are black, the legs pale, and the segment on the belly yellow on the edges.

10. The black CANTHARIS, *with livid cases of the wings*, is the least of this kind of flies, and is found upon-plants.

The *African elm* BEETLE has a black head, a brown back, spotted with white, and a chestnut-coloured neck. On the hollow part of the belly of this insect, there is a substance, somewhat resembling a pair of spectacles. It can draw the two circular parts near each other, which when it does, it makes a noise almost like a Cricket. It generally flies all the morning; but in the middle of the day it fixes upon elm-trees, to avoid the heat of the sun, and never is seen on any other; for which reason, we may conclude that it feeds on the leaves of those trees.

The STINKING BEETLE, called by some the TENEBRIO, from its hating the light, is a pretty large insect, which is all over of a coal black. The body is of such a form, that any one would conclude it was a winged insect, and that it had cases for wings; and yet *Mouset* assures us, that upon examination he could not find any, though by some it is called the black TENEBRIO *with accumulated wings*. The legs and thighs are slender, and the feelers are pretty long; being composed of joints, which are longish, except the last, that is round. The breast is marked with small specks, and has a rim. What some take for the cases

cases of the wings, are wrinkled. It walks very slowly, and keeps in the deep holes of dunghills in the day time, but comes out in the night. It has a filthy smell, which is very nauseous in places where they abound. It is a solitary animal, for two of them are seldom or never seen together.

The *black TENEBRIO*, with the cases of the wings rounded behind, is a pretty large insect, and has a back a little prominent, with a small head, and long legs. It is all over of a fine deep black, with a purplish cast, and is frequent about the hot-beds in gardens.

The *black TENEBRIO*, with prominent jaws, is not much bigger than a common fly, and the colour is of a deep dull black. The legs are long, and the feelers slender, and pretty long. It may be found on the half-rotten branches of trees. *Linnaeus* tells us, that this kind of insect has feelers like small threads, and that the upper part of the body, which appear like cases of the wings, are united together; for they have no wings at all; though it must be observed, that he mentions no more than the Stinking Beetle.

The *OIL-BEETLE*, called by *Moufet* and *Linnaeus* the *PROSCARABÆUS*, has a soft body, of a dusky-blue colour, with a shining blackish cast. On the shoulders there are two wings, or rather the rudiments of wings, which it makes use of much like *Ostriches*, to help its running, and not for flying. The circles, which surround the back and belly in the young, are greenish, but in the adult more blue. Upon the slightest motion or touch, it sheds a sort of an oil, not unlike liquid honey. *Moufet* informs us, it is never seen except in *May*; but since the change of the stile, it may now appear in the beginning of *June*.

Linnaeus affirms, that the feelers are like small threads, and that it has no wings; but there are a sort of cases, not above half as long in proportion, as in others of the Beetle-kind.

The *NECYDALIS*, so called by *Linnaeus*, is an insect of the Beetle kind, with feelers like bristles, and cases of the wings that reach but half way, leaving the rings partly naked. He has only one sort, which he calls the *Necydalis* with globous knees. Another

author says it is hardly bigger than a louse, but has a small black head, with yellow jaws, and a yellow breast; that the cases of the wings are black, excepting the middle, where they are brownish, and that it has a yellow spot at the extremities. The wings themselves are black, and twice the length of the cases, lying one over another like a cross. The feelers are almost as long as the body, and are yellowish at the base, but black elsewhere. The body is brown, with a yellowish cast on the sides, and the lower part of the legs are also yellowish. This insect is not commonly met with.

The NECYDALIS, *with a white line on the extremities of the cases of the wings*, has a black head and breast, and is of an oblong, but somewhat depressed shape. There are two white spots on the breast, and the cases of the wings are grey, being scarce half so long as the body. The wings themselves are half naked, and the feelers are twice as long as the body, and of a grey colour. The legs are also grey, and thick in the upper part. They are often met with in hedges.

The EAR-WIG, is called by *Linnæus* FORFICULA, and has feelers like bristles, a forked tail, and cases of the wings, which reach but half way, though they entirely cover the wings themselves. The feelers consist of thirteen or fourteen joints, and the covering of the breast is flat, it being truncated on the fore part, rounded behind, black in the middle, and paler about the edges. The cases of the wings are of a pale reddish brown, and at the extremity of the wings themselves there is a white oval spot. The body is of a reddish-brown. This is a very common insect, and generally known. There is another sort, about half the size of the former, but in other respects it differs very little from it.

The STAPHYLINUS, so called by *Linnæus*, is an insect of the Beetle kind, with feelers like threads, and two vesicles over the tail. The cases of the wings reach but half way, and the wings themselves are covered.

The *common* STAPHYLINUS, *with long jaws*, is about an inch in length, and the head, breast, and cases of the wings, are of a shining black, and smooth, though the cases are sometimes variegated with grey. The body is of a deep black, but not very glossy, and the legs are long and black: and there are two hard, long, very sharp horns, on the forehead. It is common under shady hedges.

The *reddish-brown* STAPHYLINUS is about the size of a common Ant, and the body is of a pale red, with a little mixture of brown, but the head, and the three or four last rings of the body are black. The cases of the wings are of a deep blue, and the legs reddish, with black joints. The feelers consist of eleven joints, and are of a pale colour, except at the ends, where they are black. It is sometimes met with near the banks of brooks and rivers.

The *hoary* STAPHYLINUS has an oblong body, of a greenish colour, with a brassy cast, and clouded with black spots. The head is large, and somewhat flat, and the mouth is forked; the feelers consist of nine joints, and the cases of the wings are short, of a greyish-black colour, with a brassy cast. The tail is furnished with two plumous hairs, and on pressing the body, two white hooks will be thrust out from the tail. It is an inhabitant of dunghills.

The *black* STAPHYLINUS is about half an inch in length, and has a long flattish body, with a black glossy head. The cases of the wings are of a deep blue, with a mixture of black, and are bright and glossy. They have a metalline cast, and have many small specks. The feelers consist of nine joints; but the principal distinction is the spots on the breast, which are ten in number, and a little hollowed. It may be sometimes met with among decayed trees in the woods.

The MILL-BEETLE has feelers like bristles, two horns on the tail, membraneous cases of the wings, and has a flattish, roundish, marginated breast. It is of the size of a Cricket, and is of a deep iron colour, approaching to black. The shield that lies over the breast is plain and oval, and the cases of the wings

are also of an oval shape; they are somewhat shorter than the body, and a little transparent. There are three streaks upon each, the middlemost of which is raised, and the more inward hollow and crooked. There are two prickles on the tail, and the legs are also prickly. The female has only the rudiments of the wings, and their cases. It never appears in the day time, and therefore is said to be a hater of the light. It is very common in mills and bakers houses. *Linnaeus* calls this a *Blatta*.

The *yellow* BLATTA is not much larger than a fly, and the shield that covers the breast is membranaceous, of an oval shape, and marginated. The cases of the wings are membranaceous and transparent, of a brownish colour, and have raised streaks, with black spots thereon. The legs look like horns, and are prickly, and the feelers are long; there are also two articulated horns or prickles above the vent. It is not met with in *England*, but is common in *Lapland*, for which reason it is called by *Linnaeus* the *Lapland Blatta*.

The *American* BLATTA, or COCK-ROACH, is of a reddish-brown colour. It is a very troublesome destructive and voracious insect, of which there are such numbers, that it is impossible to keep victuals of any kind from being devoured by them, without close covering. They eat not only leather, but linen and paper. They disappear in winter, and are most numerous in the hottest days of summer; but what mischief they do is chiefly in the night. These insects lay their eggs in heaps, which they wrap all round in a bag or web, in the manner of some spiders. When the eggs are hatched, the young ones appear quite perfect, and run out of their shells very nimbly. At first they are no bigger than Ants, which enables them to creep thro' cracks and key-holes, and into boxes and chests, where they gnaw and spoil every thing they can come at. They have two very long horns or feelers, six hairy legs, with two claws at the ends like forks, and the head is black, with a reddish round circle on the upper parts. When it is arrived at its full growth, it casts its skin, which bursts on its back, and then
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the Cock Roach is perfectly formed. The wings are soft and tender, being at first whitish, and after of a reddish colour; but the head, horns, and the remaining parts, are of the same shape and colour as before its skin was thrown off.

The insects, that *Linnæus* places under the name of GRYLLUS, have bristly feelers, membranaceous covers to the wings, which are narrow, and in the shape of the wings of the insects of the Fly kind, and their legs are proper for leaping.

The MOLE CRICKET is one of the largest insects in these parts of the world, it being two inches and a half in length, and three quarters of an inch in breadth. The colour is of a dusky brown, and at the extremity of the tail there are two hairy excrescences, resembling in some sense the tail of a mouse; the body consists of eight scaly joints, or separate folds, and is brown on the upper part, and of a dusky brown below. The wings are long, narrow, and terminate in a sharp point, each having a blackish line running down it; however, when they are extended, they appear to be much broader than at first sight could be supposed. The feelers lie on the back, and are about half the length of the wings. The shield of the breast is of a firm texture, of a blackish colour, and hairy. The fore-feet are of an uncommon shape, being as it were webbed and hairy. It is an inhabitant of fens, and other low damp grounds. When it appears, it generally runs backwards; but it keeps commonly under ground, where it burrows like a mole, for which reason it is called the Mole Cricket.

This insect makes a cell of a sort of clammy earth, the inside of which is large enough to hold two hazel nuts, and in this it lays its eggs, which amount to one hundred and fifty in number. When the winter approaches, this animal digs a hole in the earth, lower than the ground is ever frozen, to the bottom of which it takes the cell; and as the weather becomes mild, it brings it up again by degrees, till it reaches the surface of the earth, that it may enjoy the benefit of the air and sun.

The *common house* CRICKET seems to have no mouth, but on the head there is a long membrane like a tongue, which proceeds from the upper part, but it is not cloven like the mouths of animals. It has a forked tail, and at the end there are three excrescences, or strings like bristles. It has four wings, of which the outermost are longer and narrower than the undermost. The body is of a brownish colour, only the back is variegated with a deeper dye; the body is oblong, and the head almost orbicular, with black eyes and feelers, which it can turn any way. It frequents the warm parts of houses, particularly ovens and fire places. It pretty much resembles the field Cricket.

The *field* CRICKET is of a blackish colour, and the male has a longer body than the female; the head, in proportion to the body, is large, and the eyes big and prominent. The forehead is furnished with two feelers without joints, but it can turn them any way it pleases. It has six feet or legs of the same colour as the body, and those behind are the longest, that it may leap the better. The wings seem to be lightly variegated with sculptures, seeming almost to cover the whole body, and the tail is forked. The bulk of the body of the male is less than that of the female, for this last has a larger belly, and grass-green eyes, with red feelers, and a tail like a trident. They are found in the fields in the summer time, making holes in the ground, where they build their nest, and where they lie concealed in a mild winter, but in one that is severe, they die in their holes. They make a particular sort of noise with their wings, which is plain from this; namely, that when their wings are taken off the noise ceases. They sing day and night, and delight in the sun, sitting at the mouths of their holes. They frequent pasture-grounds and meadows that are quite open, for they shun shady places. They sing most when people are at a distance; for when they come near they are silent, and get into their holes.

The *water* CRICKET has a five-cornered head, with prominent globous black eyes, but not large; near the mouth there are very short feelers, and there
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Necydalis



A Pro-Scarabee?

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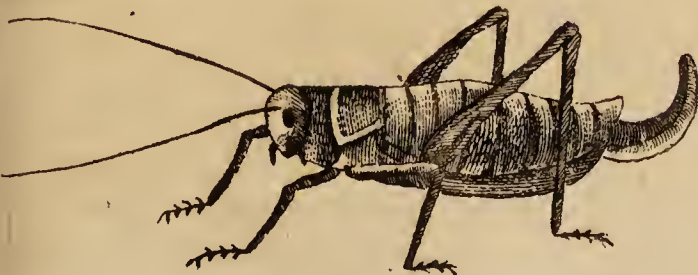


Oil Beetle?



62.

Field-Crickets?



Locusts.



are three feet on each side ; but the hindmost are much the longest. The wings are on the back, or at least the rudiments of them, and the tail is forked. The body is of a brownish colour, or rather of a whitish black. It differs from the land Cricket, in having a more prominent head, and somewhat of a neck. The wings seem likewise to be useless for flying, though they help to raise this insect up. It is commonly seen sitting upon water-plants, and is said to sing like the land Crickets.

LOCUSTS, including Grasshoppers, have the same distinguishing marks as the former ; but there is a greater variety with regard to their shapes and colours, as well as their manner of going forward ; for these never leap, like the former, but either walk or fly. Some are green, some black, some livid, and some variegated ; but many of them do not shew all their colours till they fly. Some have longer legs, some shorter, which differ in the joints. Some sing, others are mute, and some are innocent, doing no damage to the husbandman ; and others again, do such prodigious mischief, that they are looked upon to be no better than a plague.

The *Spanish* LOCUST, or GRASSHOPPER, is about two inches and a half long, and is of a deep brown, with a mixture of a whitish-grey ; there are also a great number of little white specks at the root of the wings. The outer wings are beautifully speckled with black, and the under ones seem to be formed like nets. The body is composed of seven or eight joints, and the legs are long, especially the hindmost, and very robust ; they are all reddish on the inner side, and armed with a double row of a sort of prickles. The eyes are large, and streaked with white. It is common in the southern parts of *Europe*.

The LOCUST or GRASSHOPPER, *with blood-coloured thighs, and the outermost wings of a brownish green*, is much larger than the common Grasshopper, and the body is of a pale flesh-colour on the upper part, and yellowish underneath ; but the legs are red. The outermost wings are of a close texture, being of a brownish-green, and more yellowish towards the

top. Lower down they are composed of net-work, like those underneath. The feelers are in the shape of a cylinder, and consist of twenty-four joints. The pair of legs behind are of a blackish colour, with white denticulations. There is a sharp protuberance like a thorn, on the breast, between the fore-legs, of a yellowish colour; the rest of the body is brown, a little variegated with red and blue. It is common in the northern parts of *Europe*.

The *great brown LOCUST* was seen in several parts of the city of *London*, on the 4th of *August*, 1748. The largest of them were but little above three inches long, and they had two horns or feelers, an inch in length, but the shape was not much unlike our common *Grasshopper*. The head and horns were of a brownish colour, and it was blue about the mouth, as also on the inside of the larger legs. The shield that covered the back was greenish, and the upper side of the body was brown, spotted with black, and the under side purple; the six legs were brownish, with dusky spots, and a greenish cast. The upper wings were brown, with small dusky spots, with one larger at the tips. The under wings were more transparent, and of a light brown, tinged with green; but there was a dark cloud or spot near the tips. This is supposed to be the Locust that does so much damage in many parts of the world; however, there is another sort taken notice of by *Dampier*, which are not above an inch and a half long, and as thick as the top of a man's little finger, with large thin wings, and long small legs. At one time of the year, they come in great swarms, to devour potatoe leaves, and other herbs. They are eaten by the natives in some parts of the *East-Indies*, and are caught in small nets. They parch them over the fire in an earthen pan, and when their wings and legs are falling off, they turn of the colour of boiled shrimps, being brownish before. *Dampier* eat some of them thus prepared, and thought them a tolerable dish.

He informs us, that there is another sort of *LOCUST* in *Tonquin*, about the bigness of the top of a man's finger, and as long as the first joint. It breeds in the earth,

earth, especially on banks and rivers, and ditches in the low countries ; and in the months of *January* and *February*, which is the season for taking them, they first come out of the earth in vast swarms. It is of a whitish colour, and has two small wings, like those of a Bee, which makes it evident it is not properly of the Locust kind. At first they can hardly fly, so that they often fall into rivers in great numbers. However the natives, in these months, watch the rivers, and take them up in multitudes, with small nets. They either eat them fresh boiled on the coals, or pickle them for keeping. They are plump and fat, and are much esteemed, as well by the rich as poor.

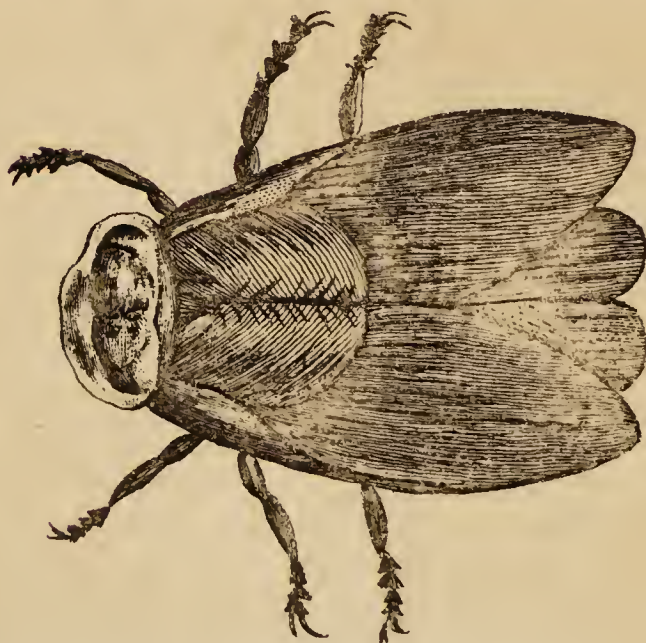
The *African* LOCUST, brought from *Barbary*, is five inches long, with a cowl over the neck, and a pyramidal head, from which there proceeds two small horns or feelers, almost an inch long, which they can raise up, and then they resemble the feathers in a *Turkish* turban. A little below the top of the head, there is a large prominent eye on each side, of a dark red colour. The body is oblong, and of a blood-purple-colour, and the tail is forked like a swallow's. It has four ash-coloured wings, marked with dusky spots ; and the fore-feet forwards, and thighs, are very slender ; but the hinder are long and thick, and marked with transverse streaks on the thighs, of a blackish colour.

Doctor *Shaw* takes notice of this LOCUST lately mentioned, and of another of the cowed or hooded kind, which has the upper wings streaked, of a light green, and the lower ones finely chequered with flesh, brown, and scarlet. Besides this, which is three inches long, there is another of two inches, with elegant green wings, that has feelers like the first mentioned, projecting like a couple of feathers on the forehead. In 1724 and 1725, he saw another kind, which were bigger than common Grasshoppers, having brown spotted wings, with legs and bodies of a bright yellow. Its first appearance was near the latter end of *March*, when the wind had been southerly some time, and in the beginning of *April* their numbers were so vastly increased, that in the heat of the day they formed

themselves into large swarms, which appeared like clouds, and darkened the sun. In the middle of *May* they began to disappear, retiring into the plains to deposit their eggs. In the next month, being *June*, the young brood begun to make their appearance, forming many compact bodies, of several hundred yards square, which afterwards marching forwards, climbed over trees, walls, and houses, eating every thing that was green in their way. The inhabitants, to stop their progress, laid trenches all over their fields and gardens, filling them with water; or else they placed large quantities of heath, stubble, and such like combustible matter in rows, and set them on fire upon the approach of the Locusts. But all this was to no purpose; for the trenches were quickly filled up, and the fires put out, by the vast number of swarms that succeeded each other. A day or two after one of these bodies was in motion, others that were just hatched, came to glean after them, gnawing off the young branches, and the very bark of the trees.

Having lived near a month in this manner, they arrived at their full growth, and threw off their worm-like state, by casting their skins. In order to prepare themselves for this, they fixed their hinder feet to some bush, twig, or corner of a stone; when immediately, by an undulating motion, used on this occasion, their heads would first appear, and soon after the rest of their bodies. The whole transformation was performed in seven or eight minutes time; after which they lay a little while in a languishing condition; but as soon as the sun and air had hardened their wings, and dried up the moisture that remained after the casting of their sloughs, they returned again to their former greediness, with an addition both to their strength and agility. But they did not continue long in this state, before they were entirely dispersed, after laying their eggs, directing their course northwards, and probably perished in the sea. The natives feed upon these insects fried with salt, and they are said to taste like the river cray-fish. Many are of opinion, that the children of *Israel* feed upon these insects in the wilderness,

A sort of Grasshopper.



derness, and that they are the same which in the scripture are called quails.

Le Brun informs us, that on the 9th of *October*, near *Rama* in the *Holy Land*, there was a south-east wind, which blew over the wilderness, and caused a violent heat, that lasted several days. He is of opinion, that it is to this wind, that the prodigious number of Locusts are owing, which flock thither in certain years, and cover the surface of the earth. In the space of two hours, they devoured all the grass and herbs round about *Rama*. There are many birds that feed upon them, and particularly storks. At the time when the Locusts engender, they make holes in the earth, about four feet deep, where they lay their eggs, which are about the size of caraway comfits, there being bundles of them together, at least four-score in number. In fifteen or sixteen days time, they become young Locusts, and are all over black, when first hatched; but in twenty-four hours they change, and become green; however it is three weeks before they can use their wings. In many places where these insects die upon the ground, there arises such a stench from their bodies, that it often breeds a dreadful plague,

The *Italian* GRASSHOPPER has a long slender neck and breast, covered with a cowl, and the head is pretty distinct from the neck. The eyes are of a blood-colour, pretty large, but the feelers are short. They have six legs, of which the foremost are much thicker and longer than the rest, which it often holds up, putting them together as if it was praying. The whole body is not plump, but lean, and it has a forked tail, like two bristles. It is often an amusement among the children of that country, to catch this animal; and, by tickling the belly with their finger, it will whistle as long as they chuse to make it.

The *Grecian* LOCUST is very like the former, only it is of a different colour, for the feelers are of a deep yellow, and the eyes are of the colour of a violet; but the wings are yellowish, and the rest of the body violet, except the fore-legs, which are hairy and whitish,

whitish, except the crooked claws at the end, which are blackish.

The *West-Indian* LOCUST is about the thickness of the barrel of a goose-quill, and the body is divided into nine or ten joints, being six or seven inches long. It has two small eyes, standing out of the head, like those of Crabs, and two feelers like long hairs. The whole body is over-run with small excrescences, which are not much bigger than the points of pins. The shape is roundish, and the body diminishes in circumference to the very tail, which is divided into two horns; and at the end of it there is a sort of sheath, containing a small dangerous sting. It has six large feet, like other Locusts, only there are two at the first joint of the body, two others at the second, and the two last are at the fourth; as to the colour, they are sometimes green, and sometimes of a yellowish grey. If any one happens to touch this insect, he is sure to be stung, and is immediately taken with a sort of shivering or trembling all over the body, which however may soon be put a stop to, by rubbing the place that was hurt with a little palm-oil. There is another insect like this, but not half so big, and it has no sting.

The *great green* LOCUST, or GRASSHOPPER, is near two inches in length, and about the thickness of a man's little finger; the forepart of the body, next the head, is covered with a sort of cowl of a triangular shape; and the colour in general is of a dusky green, mixed with brown. The female has a kind of sword, at the back extremity of the body, which consists of two parts, or longitudinal valves. It is often seen in pasture grounds.

The *small African* GRASSHOPPER is brown on the back and head, with green wings, a silver coloured belly, and ash-coloured legs; he delights in gardens, and fields sowed with corn, where they do a great deal of damage; to prevent which, they boil tobacco in water, and pour this decoction in the places where they frequent, which drives them away so effectually, that they will not return again that year. This is met with at the *Cape of Good Hope*, and makes its appearance

ance in the summer, and will feed upon grafs, when it can get nothing better. They are likewise often seen on the trees, where they devour the leaves.

The *African GRASSHOPPER*, with a red head, and dark red wings, is of the same shape and size as the former, and the back is of an ash, but the belly of a silver-colour, and the legs red. They do not appear till some time after the former; but they come always in swarms, making a terrible havock in gardens, orchards and fields, if care is not taken to drive them away.

Nieuhoff informs us, that in the *East-Indies* there are Grasshoppers and Locusts of several kinds, one of which is as long as a man's finger, but no thicker than a goose quill. The body is distinguished into several joints, and has six feet, with two small horns or feelers. Other Locusts have brown wings, with a yellow belly, and two feelers, and they can leap a great way. They are likewise seen flying together in great swarms. There is another sort, of the same shape, but green, and of the length of a man's finger; but they come in such prodigious swarms, that they devour every thing that is green in the places where they settle; infomuch that the inhabitants of *Batavia* are often obliged to change their habitations, for want of their usual sustenance.



C H A P. II.

Of four-winged Insects.

OF these there are several sorts, the first of which, mentioned by *Linnaeus*, is the Cicada, by which *Dale* understands a Bawm Cricket; but he means an insect that has a snout bent downwards, very short feelers, four cruciated wings, feet proper for leaping, a convex back, and a roundish breast.

The CUCKOW-SPIT insect, called by *Swammerdam* the Flea-Locust, and by others the Froth-Worm, has

has an oblong, obtuse body, and a large head, with small eyes. The external wings are of a dusky brown colour, marked with two white spots, and there is a broad, transverse, double line of the same. The rest of the body is of a dusky brown, and the head is black. It is usually covered over with a frothy matter, resembling spittle, which it does not discharge at the mouth, but at the vent, and other parts of the body.

The CICADA, *with green wings and a yellow head*, is as big as a large fly, but very narrow in proportion to its length. The external wings are of a fine deep green, and the internal of a blueish-grey; the covering of the breast is also green, but paler than the wings, and the head is yellow, marked with two large black spots on the hinder part, and several small ones at the sides. There are also transverse streaks on the forehead, and the body is of a blueish-grey, with yellow legs. It is commonly seen about water plants in autumn. Ray calls it the third flea Locust.

The CICADA, *with yellow external wings*, is about the size of a common fly, is all over of a beautiful yellow, except when the wings are closed, and then a longitudinal black line appears on each side the back, which is so divided in the middle, to form as it were two lines, the one running from the breast, and the other from the tail to the middle, where they are obliquely separated. The two upper parts of these lines join near the breast, and there is on each side a black spot on the head and breast, but they both unite into one. The feelers are short, the forehead is a little furrowed transversely, and the body, when the wings are extended, appears to be yellow on the middle, and black on each side. It may be met with in pasture-grounds in June.

Linnaeus has eight sorts of CICADÆ, which he calls the *American* Laternaria, the *Chinese* Laternaria, the Ranatra, the Flea Locust, the Cicada with a double horned breast, the Cicada bearing manna, the Cicada of the elm-tree, and the Cicada of the rose.

The *proper* CIMEX is generally understood to mean only a common Bug; and *Linnaeus* defines it to be an insect with a snout bending downwards, and feelers
that

that have four joints, four cruciated wings, feet proper for running, a flat back, and a marginated breast.

This has a short, flat, and almost roundish body, of a reddish colour, and of a stinking disagreeable smell. The body consists outwardly of three principal parts; namely, the head, the breast or corset, and the belly; which last is the body, properly so called. It has two brown eyes that are very small, and a little prominent, besides two feelers with three joints; and underneath there is a crooked trunk, which, when this insect is in motion, is a point lying between the two fore feet; the breast is formed of a sort of a ring, which is connected to the head by a kind of neck, and in this are placed the first pair of legs. The body consists of nine rings, of which the first is as it were separated in two, by a small furrow made of triangular bits, that joins the body to the breast. Under the belly the other two pair of legs are placed; for it has but six legs in all, each leg has three joints, which form the thigh, the leg, and the foot, which is armed with a crooked claw like a hook. The body is smooth, except a few short hairs, that may be seen with a microscope about the vent, and on the two last rings. In cold climates, Bugs generally die in the winter; but their eggs suffer no damage from the severest season. *Linnaeus* affirms he has been told, that some of these insects have been seen to have wings in the summer time; but he does not assert this on his own knowledge. Authors affirm, that they often feed upon each other, that is, they will eat the inward parts, and leave the skin and head behind.

The *green and yellow* BUG is of the size of a common fly, but flatted, and the body is of a roundish shape, somewhat oval. The feelers are slender and green, and the lowest joint is very small. The head, breast, and external wings, are of a bright green, but somewhat rough, and the belly is also green. The body is black on the upper part; the snout has four joints, and within it is a bristly tongue. There is a yellow margin or edge that surrounds the whole body. It is common in kitchen-gardens.

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The ACOLALAN is an insect like a common Bug, but it does not stink so much ; it is very small, and when it is full grown, it begins to have wings. They get into houses, where they do a great deal of mischief among cloaths.

The *brassy-blue* CIMEX is of the size of a large blue fly ; but more flat, and the upper surface of the body is of a beautiful blue, with a metalline cast. There is a longitudinal line on the breast, which at the lower extremity is terminated with one that runs cross-ways. The extremity of the shield is either red or white, and there is a spot of the same colour on each side of it. The legs and feelers are black, and the body underneath is of a blueish-black ; the spots on the male are white, and those on the female red.

The *Henbane* CIMEX, mentioned by *Linnaeus*, is a very beautiful insect ; but the body is much narrower than the former. The head is black, except on the very middle, where it is of a bright red ; the breast is black at its forward extremity, but red every where else, except two angular spots behind ; the external wings are red, only each are marked with a black spot in the middle, so that when they are closed, there are two black spots on the back. The shield is black, with a red extremity, and the body under it is black ; but the rest of the body is red, except near the vent. The wings are brown and streaked, the feelers and the legs are black ; and the trunk and snout consists of four joints.

The NOTONECTA, according to *Linnaeus*, has a bended snout, very short feelers, four cruciated wings, and feet adapted for swimming. It signifies a water Bug, or Boat fly, of which he has only three sorts, that with a white forehead, the oblong Notonec̃ta with a tail, and the least Notonec̃ta with a tail.

The *narrow water* BUG, or BOAT FLY, is above half an inch long, and the sixth of an inch broad ; the head is blunt and yellow, the eyes brown, the breast large, and of a yellow colour, but somewhat transparent. The shield is black, with a gloss like velvet, and the external wings are of a yellowish grey, spotted with black all round the edges ; the more in-

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ternal wings are whitish and transparent; the fore feet are shorter than those in the middle, and the hinder ones much longer than either. Its snout is long and sharp pointed, and the feelers very short, consisting only of two joints, but the belly is black and hairy.

The *compressed water* BUG, or BOAT FLY, is near an inch in length, and is somewhat broader and more depressed than the former. The head and legs are yellow, but the breast and external wings are brown, with many fine slender transverse streaks, of a pale yellow colour. The under part of the body is yellowish, and the eyes are black.

The *grey water* BUG, or BOAT FLY, is extremely small, being not half so big as a louse, and is all over of a whitish grey. The back is flattish, with a line running along the middle, and the fore legs are remarkably short, but those behind are extremely long in proportion; the feelers are also very short.

The other species are the great black water Bug of the *East-Indies*. The black and white smaller water Bug. The broader brown water Bug. The little yellowish streaked water Bug.

The NEPA, or *water* SCORPION, has a bended snout, feelers like lobsters claws, four cruciated wings, and four feet. *Linnaeus* has only two sorts, the pond-water Scorpion, and the water Bug.

The *water* SCORPION is a large insect, being near an inch in length, and about half an inch in breadth. Its body is nearly oval, but very flat and thin, and its tail long and pointed. The head is small, and the feelers appear like legs, resembling the claws of a Lobster, or Scorpion, but they have no sharp points. The breast is somewhat sharp underneath, and the tail is formed of two threads, which are easily parted; the legs are slender; the body consists of several joints, and the vent is remarkably large. The snout is long and sharp, and the external wings are of a deep blackish olive colour; but those beneath are white, and sometimes reddish. It is common in ponds, and is an enemy to other water insects.

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The *water* SCORPION, *with a serrated body*, is a third part of an inch long, and broader in proportion than the former species. The back is somewhat raised, and of a pale brown colour, with a small tincture of olive; the head is small, with black eyes, and the whole edge of the body is finely serrated; but the claws are smaller in proportion than in the former. It is to be met with in streams that are pretty swift.

The CHERMES, or PLANT BUG, has the snout in its breast, the hinder part of the belly pointed, four wings placed on the sides, and feet proper for leaping. *Linnaeus* has eight sorts, namely, that of the Elm, that of the Maple, that of the Beach, that of the Alder, that of the Fir, that of the Willow, that of the Ash, and that of the Nettle. Besides these, he mentions another, supposed to breed in the head of the Cerafles or horned Serpent.

The *fir-tree* BUG is of an oblong shape, and whitish colour, with a small head, and eyes pretty large and prominent, of a brown colour, and a little speck of black between them. The feelers are very small, and there is a sort of down near the tail; the wings are thin and whitish. When they are hid in the leaves or branches of the fir-tree, they make a prominence that looks like a strawberry.

The *grass* BUG is pretty large, considering the kind, and has a body a little depressed and broad; but its head is very blunt. The breast is grey, and variegated with white lines; but the feelers are white, except at the top, where they are blackish. It pretty much resembles a Grasshopper, or rather a Cricket, only the wings are not cruciated.

Besides these, other authors take notice of the apple-tree Bug, and the Germander Bug; and perhaps there may be one belonging to many other sorts of trees.

Linnaeus takes notice of forty sorts of BUGS, to which he gives the general name of Cimex: of these, the principal one is that which he calls the *Cimex with a crooked trunk, and feelers like hairs at the ends, and an oblong black body*; this is the greater oblong dung Cimex of *Frysch*. This Bug feeds upon flies, and
other

other insects, and has six feet, the hinder of which are very long, made in the form of a club, and thick near the claws. It is covered with filth, which it can easily divest itself of, and change, to deceive the eyes of the observer. It is shaped somewhat like a spider, and has a hairy furrowed body, of an ash-colour, which looks like earth, when it is dry. The head and feelers are without hair, only the last joint of the feelers is hairy. The trunk is crooked, and made like a bow.

The APHIS, or PLANT LOUSE, has a bended snout, two horns on the hinder part of the body, four erect wings, and feet proper for walking. *Linnaeus* has sixteen sorts, namely, that of the Currant-bush; of the Elm-tree; of the Elder; of the Maple; of the Lime-tree; of the Birch; of the Pine; of the Rose; of the Parsnip; of the Dock; of the *Carduus Benedictus*; of Mug-wort; of Saw-wort; of Chick-weed; of the Lily, and that of the Cabbage.

The *currant* LOUSE is about the size of a common louse, and of a brownish-green colour. The legs are green, and the joints of the knees commonly stand up above the body, and are brown; the feelers are slender, strait, and have a joint, at which they are bent near the head, and are of a black colour. The hinder part of the breast is blackish, and the sides of the body are variegated with small black spots; the wings are erect and whitish, only they have a few black veins, and two of them are very small, but the vent is prominent, and has two bristly appendages shorter than the wings.

This is sufficient to give a specimen of their shape; for as they belong to particular trees and plants, they may be readily seen thereon when the leaves are in perfection. There are doubtless many more than those already mentioned, which belong to particular trees.

The COCCUS, so called by *Linnaeus*, has the trunk on its breast, and the body is hairy or downy behind.

The COCCUS of the berry-bearing *Ilex*, a sort of oak, is what is known in the druggests shops, by
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the name of KERMES. It appears to be a membranaceous bladder, of the size of a pea, smooth, and shining; and of a brownish red colour, covered with very fine down or ash-coloured powder, swelling with reddish eggs or insects, which being rubbed with the fingers, pour out a crimson liquor. It is only met with in pretty hot countries, in the months of *May* and *June*. In *March* there is first perceived a sort of insects less than a millet-seed, and of an oblong oval form, only a little narrower towards the tail. The upper part is convex, red, and marked with exceeding minute golden specks, and a few transverse wrinkles. It has six feet, and two moveable feelers, which almost equal the length of the body; it has also black eyes, and a double tail of the same length as the body. It adheres to the trunk, branches, and leaves of the tree, and becomes torpid and immoveable, swelling or growing bigger very sensibly. If at that time its body is beheld with a microscope, it appears of a crimson colour, shining with golden specks, and lying in a sort of whitish down, which in some places of the back, under and about the belly, rises up in flocks like a sort of nest. The back rises very high, and is round, and in the forepart of the body, which is instead of a head, three protuberances are perceived, of which the middle is thickish and roundish, but those on the sides more slender and crooked about the middle.

In the month of *April*, this insect becomes of the size and shape of a pea, and its membrane or skin is firmer, and the down, which at the beginning lay in bands on the skin, covers the whole surface like a sort of powder, and then it seems to be no longer an animal, but a bladder full of pale and watery blood.

About the middle or end of *May*, the inner part of the bladder, under the belly of the animalcula, is furnished with oval grains, about half the size of white poppy seeds, of a pale reddish colour, speckled with gold. They consist of a thin, white, transparent skin, full of a pale reddish liquor. They are about two thousand in number on each bladder, and the eggs of the former insect, which being shaken off, becomes

becomes exactly the same as those that run about the branches and leaves of the *Ilex*. In the following spring, they fix themselves in the divisions of the trunk and branches, where they afterwards lay their eggs. When this insect has attained its proper size, the skin of the belly or lower part, is pulled up towards the back, leaving a vacant space between the belly and the down, infomuch that they have the appearance of Hog-lice half rolled up. It is in this space that they lay their eggs, which done, the animal dies, and is dried up. They live upon the juice of the leaves, which they suck in with their snouts or trunks.

They are of two sexes, and the females have been hitherto described; but the males are very distinct from the former, and are a sort of small flies like gnats, with six feet, of which the four forward are short, and the two backward long, divided into four joints, and armed with three crooked nails. There are two feelers on the head a line and a half long, which are moveable, streaked, and articulated. The tail at the back part of the body is half a line long, and forked. The whole body is covered with two transparent wings, and they leap about in the manner of fleas. The harvest of the *Kermes* is greater or less, in proportion to the severity of the winter; and their colour also is brighter and better, in proportion to their vicinity to the sea. The women gather them before sun-rising, tearing them off with their nails; for fear there should be any loss from the hatching of the insects, they sprinkle them with vinegar, and lay them in the sun to dry, where they acquire a red colour. This drug, however, is not in such esteem as it was before the importation of cochineal, which answers all the purposes far better.

There is another sort of *KERMES* mentioned by other authors, which the country people call worms, and which, as they affirm, lay whitish eggs, from which proceed insects of the same colour, full of silver specks. It seems to be an insect of the same species as the former, little differing from the red *Kermes*.

There is another blackish *KERMES*, found near *Leghorn* in *Tuscany*, upon the dwarf *Ilex*, like the red
kind,

kind, only when it comes to maturity, it is full of a whitish liquor, and eggs; from these a sort of insects proceed, not unlike the true Kermes, but whitish. Hence it appears there are several kinds of Kermes, which only differ in colour; but the red only is used in medicine, and for dying. Doctor *Lifter* has found an insect analogous to this, on the twigs of the cherry, and other trees; for it cannot be said to be the same. It is probable, that these species may be found equally good in medicine with the former, in making the confection of alkermes; but in the business of dying scarlet, they must be utterly useless.

COCHINEAL, as they appear in our shops, when brought from *America*, are of an irregular shape, convex on one side, and a little concave on the other; but are both marked with transverse streaks or wrinkles. They are of a scarlet colour within, and without of a blackish red, and sometimes of a white reddish ash-colour, which are accounted the best, and are brought to us from *Mexico*. They were a long while taken for fruit, but they are now known to be insects adhering to the prickly pear-tree or shrub.

The COCHINEAL INSECT is of an oval form, of the size of a small pea, with six feet and a snout or trunk; it brings forth its young alive, and is nourished by sucking the juice of the plant. Its body consists of several rings, and when it is once fixed on the plant, it continues immoveable, being subject to no change. Some pretend there are two sorts, the one domestic, which is best, and the other wild, that is of a vivid colour: however, they appear to be the same, only with this difference; that the wild feed upon uncultivated trees, without any assistance; whereas the domestic are carefully, at a stated season, removed to cultivated trees, where they feed upon a purer juice. Those who take care of these insects, place them on the prickly pear-plant, in a certain order, and are very industrious in defending them from other insects; for if any other kind come among them, they take care to brush them off with foxes tails.

Towards the end of the year, when the rains and cold weather are coming on, which are fatal to these insects,

Insects, they take off the leaves or branches covered with cochineal, that have not attained their utmost degree of perfection, and keep them in their houses till the winter is past. These leaves are very thick and juicy, and supply them with sufficient nourishment, while they remain within doors. When the milder weather returns, and these animals are about to exclude their young, the natives make them nests, like those of birds, but less, of tree moss, soft hay, or the down of cocoa-nuts, placing twelve in every nest. These they fix on the thorns of the prickly pear-plant, and in three or four days time they bring forth their young, which leave their nests in a few days, and creep upon the branches of the plant, till they find a proper place to rest in and take their nourishment; and when the females are fecundated by the males, they produce a new offspring; so that they have a harvest, as it were, thrice a year.

When the native *Americans* have gathered the cochineal, they put them into holes in the ground, where they kill them with boiling water, and afterwards dry them in the sun, or in an oven, or lay them upon hot plates. From the various methods of killing them, arise the different colours which they appear in when brought to us. While they are living, they seem to be sprinkled over with a white powder, which they lose as soon as the boiling water is poured upon them. Those that are dried upon hot places, are the blackest. What we call cochineal, are only the females; for the males are a sort of fly, as in the *Kermes*. They are used both for dying and in medicine, and are said to have much the same virtue as the *Kermes*; tho' they are now seldom used alone, but are mixed with other medicines to give them a more beautiful colour.

The *Polish* SCARLET GRAIN is, when full grown, of the size of a small pepper-corn, and is of a roundish shape, having but few appearances of an animal. It sticks to the root of the tree on which it feeds, and is of a deep purple colour, tinged with blue. It lies in a rough cup, somewhat resembling that of an acorn, when gathered for use. These grains seem to be excrescences upon the root where they produce their

young, which at first are evidently real insects, having small, and somewhat longish flattish bodies, which consist of several segments; they have six legs, which are short and slender, and two fine feelers. They are also of a purple colour, but not so deep as that of the parent. When these are grown to their full size, they fix themselves to the root of the plant, and appear as above described. The young ones are bred in the case or skins of the old ones, after they are dead. The male is a fly with two wings, as in the kinds already mentioned.

The *Polish* COCHINEAL is a sort of Kermes found at the roots of the tree called Polonian knawel, which are full of a purple juice, and worms of the same colour. This plant is very common in the *Ukrain*, especially in the most desert places. The *Armenians* and the *Turks* dye the wool, silk, and hair therewith, as well as the mane and tails of their horses.

These insects are placed by *Linnaeus* in the number of those with half wings, that have the mouth placed in the breast, and the belly hairy below; however it is only the male that has wings.

The GALL INSECTS are bred in a sort of bodies, adhering to a kind of oak in *Asia*, which differ with regard to their colour, size, roughness, smoothness, and shape, and which we call galls. They are not fruit as some have imagined, but preternatural tumors, owing to the wounds given to the buds, leaves, and twigs of the tree, by a kind of insects wherein they breed and lay their eggs. When the Galls are ripe and opened while fresh, a sort of worms are found therein, sometimes one, and sometimes more, in cells near the center, and these after some time turn to flies. They make themselves a passage out, by eating the substance of the gall; and making a round hole therein, they get abroad and fly away. However we do not meet with any author that has given a minute description of them. The very astringent quality of the gall-nut is well known. In dying, an infusion of it very speedily turns black, when mixed with green vitriol.

The *green stove* BUG is a small insect of an oval flat shape, which firmly adheres to the bark or leaves of trees. The back is a little prominent, its belly hollowed, and the forepart is blunt, but that behind forked. It has so little the appearance of an animal, that it was long taken for an excrescence on the plant, on which it was found. It appears in a kind of shell or covering, which incloses the body of the insect; it has six very slender legs; the eyes small and black, and the feelers are very slender. It is of a greenish colour, and can thrust out its legs at pleasure, sometimes moving about tho' slowly; however it generally adheres to the leaf of the tree, continuing in the same place, and sucking out the juice. The male is a small fly, and not nearly so big as the female, having a slender oblong body, and long legs. The feelers are short, and the wings white. The female is common here in *England*, on the orange and lemon trees preserved in stoves in green-houses; and is probably the same which *Linnæus* calls the Coccus of the citron tree, or the shielded Louse.

The *water* COCCUS has a body of an oval figure, rounded on the back, and flat on the belly; and its colour is brown. It thrusts out a sort of white hairy beard from its hinder part, which is cloven in two; near it is placed a blunt tubercle, and towards the other extremity another that is blunt. It is common on the leaves of water-plants, and shews its legs but very seldom, which are slender, and somewhat downy. The male is a small fly, with silky whitish wings, spotted with brown.

The COCCUS *of the birch-tree* is larger than the former, and has an oblong body, somewhat downy, composed of several rings or joints. It is of a deep dusky olive-colour, with short legs, and very slender feelers. It is common on several trees in woods, where it fixes to the division of the branches. The male is a little fly with dusky brown wings.

The COCCUS *of insects* is very small, and is found on the bodies of the larger kind of Beetles, where it is fixed almost during its whole life. The body is of an oval shape, with a sharp edge; is somewhat convex,

and of a reddish brown colour. The surface of the whole body is smooth, but not glossy, and the legs are very short, as well as the feelers, which are scarce visible.

Besides these *Linnaeus* has the COCCUS of the common Mouse-ear; that of Canary-grass; that of the Birch-tree; and there are probably other kinds not yet registered.

The THRIPS, so called by *Linnaeus*, has little or no snout, and the body is of a linear shape, with four strait wings lying on the back.

The THRIPS, *with blueish wings and a black body*, is not so big as a flea, and its wings must consequently be small and delicate. It has six legs, two near the neck, and four on the breast; the feelers are slender, black, and consist of six joints; the external wings are of a greyish colour, hairy at the extremities, and at the edges. It flies very seldom, but runs very swiftly, twisting its body into various shapes.

The *black bodied* THRIPS is about the size of a Louse, and has an oblong slender body. The external wings are very beautiful, variegated with nine alternate transverse streaks of black and white, there being three of each colour. It is found on the flowers of the larger hawk-weeds, and runs very swift, but seldom flies.

The THRIPS *with a brown body, and snow-white wings*, is of the same size as the former. Its brown appearance is owing to the wings, for the colour of the body is coal black. The legs are short, and the feelers very slender, consisting of five joints. It is sometimes found on the Bermudas cedars, which are planted in our gardens.



C H A P. III.

Of Insects with membranaceous wings, which are four in number, and reticulated with veins.

THE SCORPION FLY, called the *Parnorpa* by *Linnaeus*, and taken notice of by *Mouset*, is about the size of a common fly, and of the colour of honey,

honey, only the top joint of the tail is black, and armed with a double sting. The wings are like those of the Grasshopper, and its walk is like that of a crab. That which other authors call a Scorpion Fly, has an oblong roundish body, a small head, and a hard horny oblong snout, bending downwards. The feelers are bristly, black, and consist of thirty joints. The back is brown, the sides yellow, and the wings white, with some dusky spots disposed in transverse rows, forming a sort of line. The tail is articulated, and is terminated by a weapon resembling that of a Scorpion. This is doubtless the same insect with that of *Moufet*. *Linnaeus* says that it has a horny cylindric snout, and a shelly tail.

The *RAPHIDIA*, or *sharp-tailed Fly*, has a horny flattish head, a bristly sharp tail, and is of the same size as the Scorpion Fly, pretty much resembling it in shape. The head is black, smooth, and narrow on the hinder part, and the breast is narrow, rounded, and black. The feelers are slender, white, and consist of a great number of joints; the body is slender, oblong, and of a brown colour, variegated with transverse white lines. The wings are thin and membranaceous, being reticulated, and having each an oblong brown spot towards the edge. From the hinder part of the body of the female, there grows a long, sharp, slender, and bended weapon. It is common in the meadows near the waters in *July*.

The *CHRYSOPS*, or *GOLDEN-EYE*, by some called the Stinking Fly, is a very beautiful insect, and is about three quarters of an inch in length. Its body is very slender, and of a greenish yellow colour; the wings are very large and transparent, except the larger ribs or fibres that are of a fine green, which are pretty numerous. The eyes are very large, and have the appearance of gold; but when this insect is crushed, it sends forth an intolerable stench, for which reason it is called the stinking fly. It is produced from a worm that feeds upon the plant-lice, upon which account it is named the plant-louse Lion.

The FORMICA LEO, or ANT LION, is of the length of the common hog-louse, but somewhat broader; it has a pretty long head, and a roundish body, which becomes a little narrower towards the tail. The colour is a dirty grey, speckled with black, and the body is composed of several flat rings, which slip one upon another. There are six feet, four of which are fixed to the breast, and two to the neck. The head is small and flat, and before there are two little smooth horns or feelers, which are hard, two lines in length, and crooked at the ends. At the bases of the feelers there are two small black lively eyes, by which it can see the smallest object. Other animals have wings or feet, which enable them to advance towards their prey, but this can only run backwards, for it would sooner die than take the least step towards it; for which reason the prey must come to it, or rather into the snare provided for it, which is the only means this insect has to live.

It chuses a dry sandy place, at the foot of a wall, or under some shelter, in order to preserve its work from the rain. The driest sand is the most proper for it, because any other would defeat its labour. When it goes about to dig the hole where it takes its prey, it begins to bend its hinder part, which is pointed, and begins to work upon the sand backwards, making, after several attempts, a circular furrow, whose diameter is always equal to the depth of the hole or pit. On the edge of this first furrow it digs a second, then a third, and afterwards others, which are always less than those preceding; then it begins to sink deeper and deeper in the sand, which it throws with its horns or feelers towards the edges, and farther, marching always backwards in a spiral line, in proportion as it sinks into the sand. The repeated motions of its head throw the sand out of the circle, till the pit is quite made. It always describes a perfect circle, and traces a spiral line without compasses; and the pit itself resembles the inside of a funnel turned upside down.

When this insect is newly hatched, the first pit it makes is very small; but as it grows bigger, it makes them

them larger, one of which is about two inches and upwards in diameter, and about as much deep. The work being finished, it places itself in ambuscade, hiding itself at the bottom under the sand, in such a manner, that its two horns exactly embrace the point, which is the bottom and middle of the pit. It then waits for its prey; and if by misfortune a hog-louse, an ant, or other insect, begins to walk round the edge of the precipice, which is made shelving on purpose to make them fall into the trap, which they generally do, the Ant-Lion never fails to seize upon them. When the fall of a few grains of sand gives notice of the approach of its prey, it begins to shake the bottom of the sand, which never fails to fall down together with the prey. But if the prey is so nimble, as to run or fly away speedily, it shoots up the sand, which falls down again like hail upon it, and it being blinded and overwhelmed therewith, it is dragged by the motion of the sand to the center of the hole, where it falls between the two feelers or nippers of the enemy, and is soon buried in the sand, where the Ant-Lion feeds upon it. When there remains nothing but the shell of the body, this insect takes it up with its feelers, and throws it at least six inches from the edge of the pit; and then it goes to work again, to repair the damage that has been done. It is wonderful to consider, how this insect will wait patiently for its prey, sometimes a week, or even a month, without stirring from its place, and consequently without eating. Some of these, that have been kept in a box with sand, have lived six months and upwards, without feeding at all. However it must be owned, that those that feed, become much larger, and more strong.

When the ANT-LION attains a certain age, in which it is to change into another form, then it leaves off making pits; but it continues to make furrows in the land, though in an irregular manner, probably with a design to put itself in a sweat; after which it hides itself under the sand. Either the sweat, or a gummy liquor that proceeds from the body, unites the grains of sand, which form a sort of crust all over it, and then it appears like a ball, half an inch

in diameter; but so as to leave room enough for the insect to move. It must however be observed, that the gummy liquor also condenses into a thread, finer than that of the silk-worm, which it first fixes to one place, then to another, crossing and recrossing it in such a manner, as to line the inside of its retreat with a fine silky stuff work, of a pearl colour, extremely delicate, and perfectly beautiful. Though the work is so curious and commodious on the inside, without it appears to be nothing but sand, insomuch that it cannot easily be distinguished from that which lies next it, and so it escapes the search of birds, that might otherwise prey upon it.

This insect continues thus shut up for six weeks, or two months, and gradually parts with its eyes, its feelers, its feet, and its skin, and all the slough falls to the bottom of the ball like a rag. Then there remains a Nymph, which has other legs, other feet, and other entrails; as also wings, which are wrapped up in a skin, that seems to be nothing else but a liquor dried on its outside, in the same manner as it happens to all sorts of Butterflies. When the members of this new insect have acquired the necessary consistence and vigour, it tears its lodging, and breaks through its wall. For this purpose it has two teeth, like those of Grasshoppers, with which it eats through, and enlarges the opening, till it gets quite out. Its body, which is turned like a screw, takes up no more than the space of a quarter of an inch; but when it is unfolded, it becomes half an inch in length: then its fore wings likewise unfold, and in two minutes time become longer than the body. In short, it becomes a large and beautiful fly, laying aside its barbarity, and rapacious disposition. It has then a long slender body, of a brown colour, a small head, with large bright eyes, and long, slender, pale, brown legs, with four large reticulated wings. It greatly resembles the Golden Eye in all things, except its colour, which is not quite so agreeable. It is common in most parts of *Europe*. There are other insects a-kin to this, which only differ in their size and colour; but the progress
of

of their metamorphosis has not been so distinctly described.

The SUMMER FLY has a prominent palate, with two feelers on each side, which are twice as long as the body, and blueish-black wings. The body is oblong, and of a dusky brown; but his legs, which are slender, are of a dusky greyish black. While it is a worm, it may be frequently seen at the bottoms of small clear brooks, hid in a case of straw; and when it turns to a fly, it comes out of the water, and roves over or about the same streams. That mentioned by *Moufet* has four wings, of a brown colour, an oblong body, and two short feelers, with a forked tail, or rather with two bristles proceeding from it. However, there are a great many others of this kind, which leave sufficient room for curious enquirers to enlarge the history of these insects.

The EPHEMERA is a Fly, so called because it has been said to live but a day, which is in some sense true; though there are a sort that never enjoy the benefit of the sun at all; for they do not come into the world till after the sun is set, and die before its rising. They are in general very pretty flies, and might be ranked among Butterflies, on account of their shape and their wings. The wings are shorter and broader in proportion, than those of the common flies, and have a large base; but they differ from those of Butterflies, in not being covering with the dust that renders them opaque; for they are very transparent, and very thin. They have four wings, the uppermost of which are much the largest. When this insect is at rest, it generally lays its wings one over the other on the back. The body is long, being formed of six rings, that are larger at the origin than near the extremity, and from this a tail proceeds, that is longer than all the rest of the fly, and consists sometimes of three threads of an equal length, and sometimes of two long threads, and one short.

All Ephemera's are at first worms, and then Aurelia's; and under these forms they grow very slowly in the water; for *Swammerdam* thinks that some of this kind continue three years under the water. Mr.

Reaumur has known some that have been two years there, and many that have been one. But when the flies that proceed from these worms come to be inhabitants of the air, they all die almost immediately, though Mr. *Reaumur* asserts, that some flies of this name live for several days.

The insect that is to become the fly called EPHEMERA, has six scaly legs fixed on the corslet, which in some of these kinds is double, or as it were divided into two parts. The head is triangular, and a little flattened above and below; the eyes, which are placed before, may be distinguished by their largeness and colour. They are brown in most of these insects, and near the base of each, there is a feeler on the inner side; the mouth is furnished with teeth, and the body consists of six rings; that next the corslet is the largest, and they grow less and less to the end; the last ring is the shortest, from which the three threads proceed, which are as long as the whole body.

These insects live in different places, for some have fixed habitations, and some wander about. Those that have fixed habitations, lie in holes on the surface of the earth, under the water of rivers and slow streams. One of these seldom leaves its holes unless through necessity, and then it makes another. Those that wander about, sometimes swim, and sometimes creep on bodies that are under the water; sometimes they hide themselves among the rushes, or under pieces of wood, and at other times become quiet and still on the same bodies.

Among those that do not change their place, there are a sort of tufts on each side, which some have taken for fins; but Mr. *Reaumur* found, by the help of a microscope, that they are the gills of this insect, which he affirms to be a real fish. The number of the gills is not the same in different kinds, for *Savaminerdam* tells us, there are six on each side, and *Reaumur* seven.

While these insects continue in the state of worms, they are of a whitish flesh-colour, and the Aurelia's, when they have been just transformed, are the same; but when they are ready to become flies, they turn to a
pretty

pretty strong yellow, and the corset is brown. The Ephemera's of *Holland* appear about St. John's day, when clouds of them may be seen; whereas they do not appear about *Paris* till the middle of *August*. Some make their appearance about six o'clock, that is about two hours before sun-set, while others are not seen till the sun is just ready to disappear.

Though the lives of these flies are so short, they have sufficient time to perform the end of their production; for they are no sooner metamorphosed into flies but they begin to lay their eggs, which some do in rivers, and others on any substance that they meet with; they lay two bunches of eggs, and each bunch is said to consist of three hundred and fifty.

There are several sorts of flies belonging to this class, that live several days, as was before observed; one kind of which is in a condition different from all other flies, for they have still another case or skin to get rid of. These are to be seen in the fields, and in woods distant from any water; but it is more common to find them among those that are nearest. Some of these may be seen sticking upon walls and trees, and often with the head downwards, without changing place, or having any sensible motion; for they wait for the moment when they shall be divested of their last incommodious garment; but sometimes this does not happen till twenty-four hours are expired.

The EPHEMERA, *with white reticulated wings, and two hairs at the tail*, is a pretty large fly, with an oblong slender whitish body, except towards the tail, where it is brown. The head is small, and on its top there are two prominences, which have the appearance of eyes, but are really placed above them. The breast is compressed, and the two hairs of the tail are twice as long as the body; between them there are two short and crooked ones; the legs are white as snow, but those before are longer than the rest. It is commonly seen flying over waters in the summer months.

The EPHEMERA, *with streaked wings*, is a small fly, with an oblong slender brownish body, and a blunt tail without hairs. The wings are large, white,

and streaked, and so formed, as to appear like network. There are two prominent tubercles on the head that are smaller than the eyes, and the male has a black breast, and a transparent body; but that of the female is of a reddish brown.

The *brown* EPHEMERA is about the size of a Gnat, and has an oblong slender body, of a dusky brown, with a black breast, and long and slender legs. The wings are large and transparent, and somewhat of a whitish colour; and the tubercles above the eyes are very large, being of a deep blueish black; there are also two hairs at the tail, which are as long as the body.

The LIBELLULA, so called by *Linnaeus*, is a sort of water Fly, for which reason they are called water Nymphs by the *Germans*, and sometimes Dragon Flies.

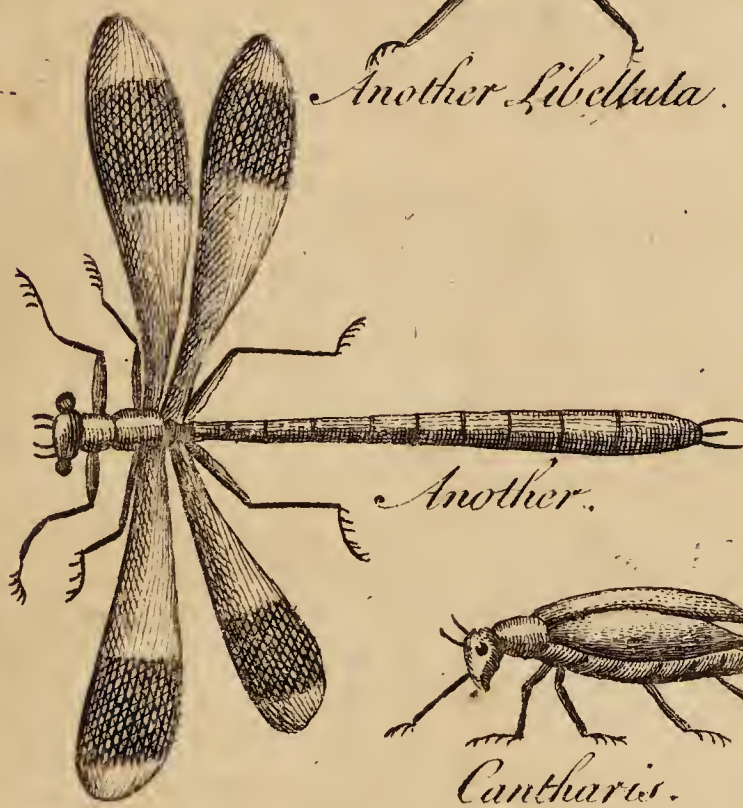
The *blueish green-bodied* LIBELLULA is a beautiful insect, and has a body almost an inch in length, which is of a fine green, with a blueish cast. The head is large, as well as the eyes, which are prominent; and the legs are slender and black. The wings are brownish, with a yellowish tincture, and have each an oblong white spot near the edge. The male has a blue body, with blueish wings, and is commonly seen flying over waters.

The *red-bodied* LIBELLULA has a body nearly as long as the former; but it is more slender, and of a bright red colour, with a large head, and large prominent eyes. The legs are slender, and there are some black lines near the segments of the belly; but the wings are pellucid and brownish, and have each a brown spot near the edge. It is common about fish-ponds.

The LIBELLULA, *with a double spot on the edge of each wing*, is near an inch and a half long, and considerably thick; but it is larger at the two extremities than in the middle. The breast is thick, of a greyish colour, and hairy on the upper part; the wings are yellowish towards the base, and whitish elsewhere, except the double spots, which are of a dusky brown. The body itself is of a shining-green, and a little hairy



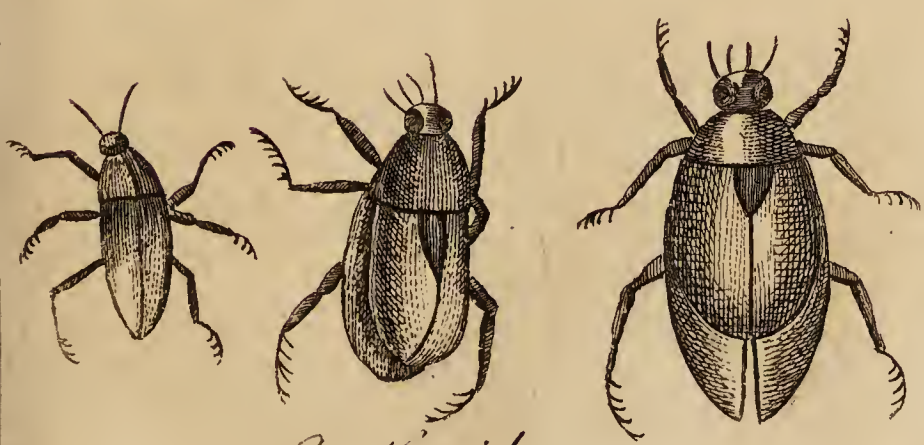
Another Libellula.



Another.



Cantharis.



Cantharides.

hairy on the sides, and the tail has two appendages. It is common about rivers.

Linnaeus likewise divides these insects into the middle sized, the small and the great.

1. The first of the middle sized is called by that author the LIBELLULA, *with a silky shining body, and wings of a yellowish dusky colour.* It is termed by *Ray*, the middle sized Libella, with a blueish-green body, and dun wings without spots. It frequents the sides of rivers, and the colour is blue, inclining a little to black; the wings are of a yellowish brown, without any speck on the external edges of the wings, which all other kinds are marked with, except the two following.

2. The LIBELLULA, *with a blue shining body, and wings of a blueish-green, dusky at the point, and without spots on the edge,* is called by *Ray* the middle sized Libella, with a blue body, and the greatest part of the wings of a blackish blue. This likewise frequents rivers, and is of the size and shape of the former; but the wings are of a blackish blue, with the points of a pale brown, and the tail horny at the end.

3. The LIBELLULA, *with a greenish-blue body, dusky wings, and a white spot upon the edge,* is termed by *Ray* the middle sized Libella, with a green body, and wings of a dunnish colour, marked with small spots, that are white near the extreme angle. The body is of a green shining colour, with black feet and brown wings, which are marked on the edges with an oblong white spot. Some think it is the female of the former.

4. The LIBELLULA, *with a silky shining body, and the wings of a dusky gold colour, marked with a black spot,* is termed by *Ray* the middle sized Libella, with a body partly green, and partly blue, and the wings marked in the middle with very large blueish black spots. The body is of a bright blue, the feet black, and half the wings next the point, of a blueish-black, with points of a gilt brown; the other half of the wings, near the base, are of a gold colour.

Of

Of the LIBELLULA of the small kind are,

1. *That with a silky body, and the wings marked on the edge with a dusky spot.* It is called by Ray the lesser Libella with reticulated wings, a green back, and whitish furrows. This fly flutters on the sides of marshes, and has a back of the colour of copper, with gilded shining wings, marked on the edge with a rhomboidal brown speck. The wings are composed of two nerves, which are particular to this insect; and the breast, belly and sides, are of a livid colour; the eyes are of an ash-colour, but brown above, and the head, as far as the back, is of the colour of copper. The feelers are black, short, and thick at the last joint.

2. The LIBELLULA, *with a flesh-coloured body, and wings with a dusky spot on the edges,* is termed by Ray the middle sized Libella, with two black spots near the incisures. It is very like the former, both in size and shape; but near the furrows of the belly there are black lines or characters, and a brown spot on the edge of the wings.

3. The LIBELLULA, *with a silky body, and the edge of the wings marked with a black spot,* is named by Ray the Libella with a blueish livid body. It has white wings, and the upper part of the body is of a greenish shining blue, without mixture.

4. The LIBELLULA, *with a blue body variegated with ash-colour, and a black spot on the edges of the wings,* is called by Ray the lesser Libella with short wings, and a blue body, marked with transverse black spots. It is of the same size and shape as the three former, and the wings are white; the joints of the belly, viewed before, are of an ash-colour, and behind of a shining blue.

Of the large kind of LIBELLULA there are,

1. *That with a double spot on the edges of the wings,* called by Ray the greatest Libella, with a long, shining, slender, smooth, greenish belly, at the beginning, and swelling near the end. It is distinguished from the rest, by having two spots on the wings, that are white, but yellow towards the base, and black underneath the yellow colour.

2. The

2. The LIBELLULA, *with white wings, but yellow at the base*, is named by Ray the greatest Libella, with a broad, short, yellow belly. It is yellow on the back, but black underneath; and on each side there are two oblique yellow lines. The forehead is green, the eyes grey, the feet black, and the wings of a rusty colour at the base.

3. The LIBELLULA, *with a dusky body, and white wings*, is called by Ray the greatest Libella with a yellow narrow body, and no dusky spots at the root of the wings. The body is black, the wings white, with a reddish brown speck on the edges, and the vent without any appendage.

4. The LIBELLULA, *with yellow sides and white wings*, is commonly seen on waters, and the sides of the breast and belly are of a yellow colour; the specks on the edges of the wings are of a brown rusty colour.

5. The LIBELLULA, *with a green shining breast, yellow lines, pale wings, and a black belly*, is termed by Ray the great Libella with a short blue belly. The head and breast are of a shining green, the eyes brown, and there are two yellow lines on the sides of the breast; but the wings are of a whitish-yellow at the base, and the marginal spot is brown.

6. The LIBELLULA *of a gilded green, with pale wings and black feet*, is like the former, only it differs from it in the male, which has a dentated tail, and in the female, whose tail consists of leaves, in the shape of a lance.

7. The grey LIBELLULA, *with yellowish wings, and the sides of the breast marked with yellow lines, with a tail consisting of two leaves*, is called by Ray the great Libellula with a long slender body, and yellowish wings.

8. The LIBELLULA, *with the breast of a yellowish green, with black lines, and a blackish belly, with yellow marks*, is known by no other description.

C H A P. IV.

Of mealy-winged insects, with a spiral mouth.

A BUTTERFLY is a flying insect, with feet and wings, some of which proceed from Worms, and others from Caterpillars, or rather from Aurelia's, into which the Caterpillars have been changed. Their vivacity, their beautiful appearance, and their surprising variety of colours, cause them to be highly valued by naturalists, and most curious persons. Some delight in the sunshine, and others seem to avoid it, for which reason they are divided into two sorts, the diurnal and the nocturnal; the last of which are usually called Moths. All kinds of plants have their particular Caterpillars and Butterflies, as hath been observed long ago. *Swammerdam* has described an hundred and fourteen kinds of Moths, and the Aurelia's, from whence they proceed, and *Aldrovandus* an hundred and eighteen. *Moufet* has given the figures of eighty-six; *Hoffnegel* of fifty, and *Goedard* of seventy-seven diurnal Butterflies.

The external parts of BUTTERFLIES are their wings, their eyes, their feelers, and their trunks, all which shall be taken notice of in their order. They have all four wings, quite different from those of flies and other winged insects; for they are covered with a sort of dust or meal, which sticks to the fingers of those that touch them; whereas the wings of flies are transparent, and seem to consist of a kind of gauze; likewise the wings of Butterflies are opaque, which is owing to the powder wherewith they are covered, and which paints them with all sorts of beautiful colours. The wings of Butterflies of different kinds, have on the same wing different kinds of powder or meal, in different places. Their wings are composed of several thick nerves, which render the construction very strong, though light. They with ease are enabled to support themselves a long while in the air, though
their

their flying is not very graceful. When they design to fly to a considerable distance, they ascend and descend alternately, as well as go sometimes to the right hand, and sometimes to the left. By this method of flying, they often avoid the pursuit of birds, that are always ready to catch them.

The body, to which the wings are fixed, is semi-transparent, and almost without any colour, or at least the colour is the same throughout. The meal with which the wings are covered, appears to be so many small feathers through a microscope, though some call them scales. These are sometimes blue, red, yellow, black, or white. Many of these last shine like silver, or rather mother of pearl. The other parts of these insects are principally three, which carry or contain all the rest. The head is the first. That which is called the body in large animals, may in Butterflies be divided into two distinct parts, the anterior and the posterior. The first is the corslet, which may be looked upon as the breast, and the second is the body, properly so called, because it contains the intestines, and the parts of generation.

On the heads of Butterflies are the eyes, the feelers, and the trunk; but the eyes have not in all exactly the same external form; however they are all nearly the portion of a sphere, and in some it is half, but in others the most considerable part. Some have them large, and others small, in proportion to their heads. The outward coat of the eyes, which by its position and consistence, may be called the cornea, has a sort of lustre, in which may often be seen all the colours of the rainbow. But the colour which is the ground of the rest, is black in some, grey in others, brown in many, and in divers of a gold colour, or very shining bronze, which has sometimes a red, sometimes a yellow, and at other times a greenish cast. The cornea has the appearance of a multiplying glass, for it has a great number of sides. *Leuwenhoeck* pretends that there are 3140 on the cornea of a Beetle, and above 6000 on that of a Fly. *Puget* has counted 17325 on each cornea of a Butterfly.

Malpighi

Malpighi takes these segments to be so many eyes, in-
somuch that these insects, instead of having two, like
larger animals, have the vast number just mentioned.
The cornea is full of small eminences, which are look-
ed upon as so many crystals, and each crystal, according
to modern observations, has all the requisites of a com-
pleat eye. However *De la Hire* has doubted, and even
denied, that they are real eyes.

Almost all sorts of flying insects have two sorts of
horns on their heads, which differ in their structure
from those of large animals, and these are commonly
called feelers. But there is a great deal of variety in
their form and construction, which yield in part a
characteristic of the several kinds and classes. In
general the feelers differ from horns, in being move-
able at their base, and in having a great number of
joints, by which means the insect is enabled to turn
them every way, or to all sides. Those of Butterflies
are placed at the top of the head, pretty near the
external edge of each eye. They are divided into
six kinds, which differ from each other in their
shape.

Those of the first kind are of an equal thickness or
diameter, from the root to their end, being almost
cylindrick, but they terminate in a large head, nearly
resembling that of a club; for which reason they are
said to be clavated; or rather they may be said to be
like the head of a nail, because they do not grow
gradually thick to the end, but have a head as it were
placed thereon. Some of these heads are shaped like
an olive, which is the most common sort of this class;
others have heads half as long again as an olive, that
is of a truncated olive. Feelers of this kind, beheld
through a microscope, appear to be covered with hair;
though some of them are smooth. A great number of
diurnal Butterflies, that settle upon flowers, have feelers
of this first kind.

The feelers of the second kind are commonly more
short, in proportion to the body of the Butterfly, than
those of the former. The true characteristic of these,
is to grow gradually bigger from the root to the
extremity, at least as far as the terminating point,
which

which is placed on the lower side, and from which proceeds a kind of tuft, composed of several threads. These properly represent the club of *Hercules*, and these belong to those Butterflies which flutter over flowers, and do not settle thereon, and whose wings make a buzzing noise as they fly.

The third sort of feelers are more broad than thick, whereas in others they are more thick than broad. Like the former, they increase in diameter, in proportion as they recede from the head; and are in the form of rams horns. These sort of Butterflies are very common in meadows.

The fourth sort of feelers terminate in a sharp point, like those of the second kind; but they are different from them, as well as from others, by increasing suddenly a little above the root, and in keeping that thickness nearly to the end, where they turn a little, and terminate in a point, which sometimes has another point, composed of several threads, extremely small. Through a microscope may be seen on these feelers, two rows of hair, and they belong to several kinds of the large Butterflies. They are thick, and yet short, in proportion to the length of the body. These are called by *Reaumur* prismatic feelers, because through the greatest part of the extent, they are in shape almost like a prism; however on one of these sides there is a furrow.

The fifth kind of feelers are thicker at the roots than elsewhere, and their diameters grow gradually less, till they terminate in a point. Some of these are short, and others long, in proportion to the length of the body.

The sixth sort of feelers are of a more singular structure, and are called feathered feelers; for to the naked eye they appear to have a stem, from whence on each side, there proceeds a sort of threads, disposed like the webs of feathers; they grow gradually smaller to the end, and are not so closely set as in feathers. These serve to distinguish the sexes in the Butterflies to which they belong; for those of the males are more beautiful than those of the females, and have longer webs. The great beautiful peacock Butterfly yields
an

an instance of this kind. All these several sorts of feelers are moveable at the root, and some of them lie down on the body, while others are carried upright, and others again bear them sometimes upright, and at other times lay them down. Some Butterflies carry their feathered feelers like the ears of hares. Besides their being moveable at the base, some can bend them more or less, and turn them every way, which is owing to the great number of joints of which they consist. As for the use of these feelers, it is very uncertain; for some would have them to guard the eyes, which cannot be the case, because they are generally smallest at the root; others think they are designed to clear the eyes; and others again, that they serve like the staffs of blind people, to give them notice when they are going to strike their heads against any object. But *Reaumur* imagines that they are the organs of some sense or other, and particularly of smelling; but this is nothing but conjecture. Some of these feelers appear like hollow tubes; others are of the consistence of horn on the inside, and some of these have even a kind of a gloss. In some they are brown, in others black, and in others again they are yellow.

The use of the trunk is better known than that of the feelers; for this is employed by many to suck out the juice of flowers. However this is not the case with all, for some have no sensible trunk, as for instance, the silk-worm. The trunk of Butterflies is seated exactly between the eyes, and when these insects do not seek their nourishment, it is rolled up like a curl; each turn, as in watches, surrounding that which goes before. Some are so short they form but one turn and a half, and others two turns. Those of the middle size consist of three turns and a half, while the longest form eight or ten turns. When it is rolled up, there is but one part of the circumference that is to be seen. A Butterfly, when this trunk is made use of, flies round some flower, and settles thereon, or near it, for some moments, and then the trunk is thrust out, either wholly or in part; after this it is thrust quite out into the flower, to the very bottom of the cup, let it be never so deep. This being done seven

or eight times, the Butterfly then passes to another flower. It hovers over those that they find agreeable to their taste in the manner of birds of prey. The substance of the trunk seems to be a kind of plate, more broad than thick, and of a substance not unlike horn; it consists of two equal parts, which are like each other in all respects. There is some variety in the colour of these trunks, for some of them are black, others reddish, or of a chestnut colour, others of the colour of fillemot, and others again of a bright yellow. Some are covered with hair on their lower surface, others are entirely without, and others have some on their sides. The trunks likewise differ in their figure and their inward structure. The trunks in the shape of a cord are shorter and thicker than others, and have only a single canal on the inside.

The corslet is the forepart of the Butterfly, and is more solid than the rest, because the fore wings are fixed thereon. It likewise supports all the motions, and is composed of several pieces of thick scales, so firmly united together, that they have no manner of play. The legs are likewise placed on the corslet, which are six in number in every kind; though some make use only of four, either for walking or standing upon, the two fore legs not being designed for these purposes; but the other four have each a foot, which terminates in hooks. Each foot is covered with hair, which makes it look like the end of the cord of a furred tippet. They often keep the two fore legs applied to their bodies, where the long hair conceals them so much, that it is sometimes difficult to know whether they have any such legs or not, till the other four are pulled off.

The body is the hinder part of the Butterfly, and is composed of rings, of which the upper part at least is evidently shelly or cartilaginous. The shape of which proceeds from the assemblage of these rings, which are of a kind of olive colour, and are more or less long in different Butterflies. These rings are often concealed under long hairs or feathers; but besides these hairs or feathers, they are covered with scales, like those of the wings. The upper circumference of the edge of each
ring

ring that receives the edge of the following ring, is most rough, with pointed scales.

The *diurnal* BUTTERFLIES may be easily distinguished from the nocturnal or moths, especially by the shape of their feelers, as all those that have clavated feelers are of the diurnal kind; for none that bear these are ever seen to flutter about a candle in the night time. There are also other feelers that may serve to distinguish the diurnal Butterflies, and such are those of the second kind; but those that have feelers like rams horns, are generally thought not to belong to diurnal Butterflies. Moths have also feelers of the remaining kinds, that is a fourth, fifth, and sixth; and the Moths which fly into houses in the night time, and burn themselves in candles, have always feelers of one of these three kinds. However, there are Butterflies with these sort of feelers, that are seen flying in the day time in the woods; but *Reaumur* has observed these to be the males that were seeking after the females, which sat very quietly and still upon the leaves of trees; therefore the best distinction of a Moth is, that it is never seen flying from flower to flower in the day time.

The class of diurnal BUTTERFLIES is not near so numerous as the nocturnal or Moths. *Reaumur* has subdivided them into four species: the first of which consist of those that have clavated feelers, and keep the plane of their wings perpendicular to that of position, and whose lower wings are applied close to the under part of the body; these likewise stand and walk with each of their six legs. The white Butterfly, spotted with black, is an instance of this kind.

The second species consists of those that have their wings perpendicular to the plane of position, and whose lower edges likewise only embrace the lower part of the body; but then they only settle upon four legs, for there are never more to be seen, either when they walk or are at rest. They generally keep their fore legs folded up. Several kinds of the prickly Caterpillars produce Butterflies of this class, and particularly the prickly Caterpillar of the nettle.

The

The third class is composed of Butterflies that carry their wings erect, and have the same sort of feelers as the former; they make use of but four legs, like those last mentioned; but they have none that terminate like the ends of the cords of tippets; for they are made like the other legs, but so very small, they can hardly be seen. A Butterfly that is very common in the meadows and fields, towards the end of *June*, and all *July*, is of this class. There are very small Butterflies that resemble the former, in the colour of their wings, and belong to the same class; as also other kinds, that have their wings spotted with black and white, in the shape of the squares of a chess-board.

The fourth class likewise contains Butterflies that have clavated feelers, and that hold their wings perpendicular to the plane of position, but have the edges of the lower wings turned up, so as to embrace and cover the upper part of the body, while all the rest is naked. Besides each lower wing has a long appendage near the external end of the base, and a part, whose point reaches much beyond the rest of the body. This part seems to form a tail, and therefore this insect is by some called the tailed Butterfly. However there are Butterflies that want these appendages, and yet have their lower wings so bent, as to embrace the upper part of the body. They have six real legs, and are generally seen towards the end of *July*.

The fifth class consists of those which have clavated feelers, and six true legs; but when they are at rest, generally keep their wings parallel to the plain of position, or at least never raise them high enough for the two upper wings to meet each other above the body. There is one Butterfly of this class, which proceeds from a smooth Caterpillar of marsh-mallows.

The BUTTERFLIES of the sixth class are characterized by having clavated feelers, that increase in thickness from the root to the point. These fly about almost continually in the day-time, hovering over flowers, and thrusting in their trunks to suck out the juice. The noise that they make with their wings, is the reason that some call them buzzing Butterflies; but

but *Beaumont* places them in the same class as fly Butterflies; because their wings are not so entirely covered with meal, as to be quite opaque, for they are transparent, at least in some places.

BUTTERFLIES of the seventh class, are those with feelers like rams horns; such as the Butterfly that is very common in meadows, but flies little in the day time, and is usually on the stocks of plants. *Merian* would have it to be a Moth. *Ray* places it among the diurnal Butterflies, as well as *Reaumur*. He also makes another class of those Butterflies, which have feelers like conical threads.

There are innumerable BUTTERFLIES, the largest of which is, 1. The GREAT BUTTERFLY, being eight inches wide when the wings are extended, and four inches long from the head to the horns, which are remarkable at the end of the wings. It is variegated with yellow and black, the darkest places in the female of the last colour, and all the rest yellow, except the globous extremities of the internal wings, which are of a dusky-colour, and appear like so many sapphires; and the eyes are of a gold colour, being remarkably large and roundish.

2. The BUTTERFLY, *with black eyes and long feelers*, is nearly as large as the former, and is variegated with red and black, except the larger eyes, near the ends of the lower wings, which have a pupil of a flame-colour, and a ruddy semicircle near them.

3. The third kind is nearly of the same colour as the former, only the outward jags or appendages of the internal wings are of a blue colour like wood, as well as the three spinthers which are on their hollow part.

4. The queen of the BUTTERFLIES is so called by some, because it has as it were four diamonds on the external wings, surrounded with shining hyacinths, or at least fanciful people call them such. They are very bright and shining, and seem to sparkle; by which marks this may be distinguished from every other sort.

5. The

5. The *ruddy-headed BUTTERFLY*, with feet and feelers of the same colour, and the eyes like hyacinths, has a blackish-blue back, and a yellowish belly. The wings near the base are of a bright yellow, from whence they become more dull; but the outermost parts are of the colour of rusty iron, or rather of a blackish-brown, marked with three yellow spots. When the other sides of the wings are viewed, the uppermost are of a faintish mixture of green and yellow, marked with six or eight remarkable spots. The internal wings are of a grass-green, and marked with two white spots; but the belly and face are yellowish. This insect proceeds from a whitish Caterpillar, marked with brownish spines or prickles.

6. The *BUTTERFLY*, with the upper wings blackish on the outside, has a dull reddish stripe, running obliquely through the middle part to the edge; their extremities have a border marked with milk-white spots, and the very edges are a little jagged; but on the inside the border is of a finer and deeper colour, and near the root it is blueish. The lower wings are all over of a dusky-brown on the outside, except a reddish streak, speckled with black on the borders, and there are four spots, two of which are double, variegated with divers colours; but within they are of a blackish purple-colour, changing at the extremities to a very dull red. The body is black, but the eyes, feelers, and feet, are all of a dusky brownish colour.

7. The *black-bodied BUTTERFLY* has two white spots between every joint of the back, and the wings are of a reddish yellow, marked with black spots, and others that are white. There is a border on the external or lower parts, a little denticulated, and on the border itself there are twenty spots like studs, of a blueish-black colour, which are extremely bright and shining.

8. The *BUTTERFLY*, with an undulated body, has wings variegated with red, yellow, and brown; but they are not bright, though they are soft to the touch.

9. The *ash-coloured* BUTTERFLY has wings, which on the inner surface are somewhat of the colour of *Indian galls*; the eyes are of a jet-black, and the feelers full of knots or joints.

10. The *black-bodied* BUTTERFLY has the shoulders covered with a sort of yellow down, as well as all the head, and the feelers are also yellowish as far as the head, near which there is a blackish-red spot. Round the external part of the wings there is a border, that seems to be beset with pearls, at equal distances, but within they are spotted with black. The inner part of the lower wings is of a shining greenish-white, sprinkled with specks of a silver-colour. The spots that seem to be pearls on the outside underneath look like silver, or at least somewhat like it.

11. The BUTTERFLY, *with the external wings of a flame-colour, marked with six black spots*, has the root of the undermost of a firey-red colour, which higher becomes paler. The body is rough, with a brownish sort of hairs, and the feelers and feet are of the same colour.

12. The BUTTERFLY, *with wings of a blood-red colour, marked with black spots, and rays or threads, that shine like gold round the edges*, has a body of a blackish-purple, and the eyes of a gold colour; but the feet and feelers are blackish.

13. The BUTTERFLY, *with a black body and wings, with points on the edges*, have them adorned with a sort of golden studs, that are black in the middle. The eyes are small, as black as pitch, and set in a head that seems to be gilded with gold; but the feelers are speckled with white and black, and are clavated at the end.

14. The BUTTERFLY, *with a whitish-black body beset with hairs*, has black eyes, with a whiteish pupil. About the eyes there is a smooth circle, almost of a snow-white colour; but the feelers are like those of the former, and the outer surface of the wings is of a flame-colour, marked with gold-coloured lines, and there are dentated black lines on the border. Towards the extremities there are three large silver-coloured spots, placed almost in a triangle. The internal

ternal surface seems to be adorned with several golden scales and studs, placed one upon another, like the guttered tiles of the roof of a house. At the extremities of the wings there is also a golden line, insomuch that they make an appearance somewhat like those of a peacock. The legs and feet are a little blackish, and the trunk or snout consists of a spiral line, or string.

15. The BUTTERFLY, *with a blueish body above, and ash-coloured below*, has wings that terminate in spines, having the edges almost like those of Batts, and they are marked without with dusky lines, that intersect each other, but within there are six blackish studs. The trunk or snout of this also consists of a spiral thread, that curls like the tendril of a vine.

16. The BUTTERFLY, *with a yellowish red back*, has the upper surface of the external wings of a darkish green, marked with whitish and yellowish spots and spaces; the internal wings are entirely red, only they are marked with ten black spots: The belly is adorned with eight shining yellow scales, and the tail is like a grain of barley. The shoulders are hairy, and have a spot like a half-moon on the lower part; the eyes are reddish, with a silver-coloured pupil.

The *yellow and orange-winged* BUTTERFLY has but a little down on the wings, for they appear transparent on the yellow parts; the body is of a dusky colour underneath, and browner above; the ground of the upper wings is yellow and orange, mixed together in shades, and the under wings are orange. They are all variegated, spotted, and bordered with black, and the under sides of the wings have white spots round their borders. It was brought from the *West-Indies*.

The *black* BUTTERFLY has the body and ground-work of the wings of a very black velvet-colour on the upper sides; but beneath the back it is more rusty. The late Mr. *Edwards* had two of these, the biggest of which had a large irregular white spot on each of the upper wings, and on the under wings were seven fine red longish spots on each, besides six little red half-

moons between the points of the scalloping of the wings, and there were also four white spots on the body. The lesser Butterfly had a cloud of broken spots, of a yellowish colour, on the upper wings, and longish red spots on the lower, much like those of the larger Butterfly; but the small half-moons between the scallops were white. They were brought from the *West-Indies*.

The *yellow* BUTTERFLY has a reddish head, and a dusky body, with wings of a bright yellow, irregularly bordered with black; the under side of the body and wings are wholly yellow. It was brought from *China*.

The *little black and white* BUTTERFLY was brought from *China*, and has the upper side of the wings of a black dusky colour, with cream-coloured oblique bars across them. The head and beginning of the body are of a bright red, but the remainder, and the tail, are of a fine blue, which runs a little into the black of the longer wings, where they join to the body; the under side is coloured, and marked in the same manner as the upper, except that the colours are a little fainter.

The *ATLAS*, so called by the *Dutch*, is a Butterfly of *Surinam*, and has the hinder part of the wings beneath of a fine blue, but above they are striped with blue and white, mixed with brown. On the outside of the wings there are three circles or spots, which are black, yellow, and brown, and seem to be enamelled. It proceeds from a large red Caterpillar.

The *small* *ATLAS* is another beautiful Butterfly of *Surinam*, the under part of whose upper wings are of a fine bright oker colour, and the other pair of a fine blue. The under part of the body is streaked with yellow, brown, white, and black. It proceeds from a brown Caterpillar, that feeds upon the leaves of the banana tree.

The BUTTERFLIES of a middle size, are,

1. That with a palish yellow body, with yellowish eyes, and dun feelers. The internal wings are each marked with a deep yellow spot on the outside, but within they are of the colour of faded grass, with a brown

brown spot. The back is of a blackish green, and the belly yellowish. It proceeds from a Caterpillar of a shining gold colour.

2. The BUTTERFLY, *with lead-coloured wings, inclining to black on the surface, and marked here and there with dusky spots*, has a body of the same colour, and the wings are serrated on their upper edges, with a sort of sharp prickles. In general it makes a very dismal appearance.

3. The BUTTERFLY, *with a dusky body, and black eyes*, has blackish feelers, and the wings are thorny on the edges; but the outer wings are of a palish yellow, marked with three black spots or spaces; the internal wings near the root are of a dusky colour, but pale in the middle, and nearer the ends chequered with whitish lines.

4. The BUTTERFLY, *with a black body, and a whitish belly, face, and breast*, has feelers of a blackish yellow, and four blackish wings marked with ridges, which terminate in points of a shining reddish colour. When it sits upon flowers, and lifts up its wings, the first pair seem to be adorned with an elegant yellow shield, whose center is pale, and the boss as black as pitch, with the outer circle of a citron colour.

5. The *livid-bodied* BUTTERFLY has feelers of the same colour, and fiery red eyes; but the shoulders are pale and rough, with a sort of hair or down; and the head and wings are pale.

6. The *sandy-winged* BUTTERFLY has a black back, and a brownish belly, with black eyes that have whitish pupils. The feelers are as black as a crow, and the upper surface of the wings are of a dull weasel colour.

7. The BUTTERFLY, *with a black shining body*, has wings like the stone called the pyrites, that is, the inside of it, and their borders are sprinkled with black spots. The feelers are speckled with white, and the sparkling golden eyes are seated in a coal-black forehead.

8. The BUTTERFLY, *with a black shining body, and feelers of a reddish-yellow colour*, has wings that seem to be embroidered, being variegated with several colours,

lours, and spots of different shapes ; but they are not very bright, tho' they appear agreeable enough.

9. The BUTTERFLY, *with a dusky white body, and prominent black eyes*, has the external wings variegated with dusky yellow spots, and their back part is painted with a sort of a black shield, in the middle of which there is a spot as white as ivory. The internal wings have four of these shields, with a yellowish circle, of which the middle two are plain, but those on the sides small and dull. Their insides are of a smoaky colour, and seem to be composed of six plates, artificially joined together.

10. The BUTTERFLY, *with a reddish-yellow body, and a milk-white head*, has wings variegated with white, dusky, and black spots. The sides are of a reddish-yellow colour, and there are nine or ten black spots between the joints of the body.

11. The BUTTERFLY, *with a dark brown body, and flame-coloured wings*, has a broad, and, as it were, a feathered tail, and narrower wings than other Butterflies ; the nose is crooked, like the beak of an Eagle, and the belly is of a hoary colour. The feelers are strong, large, and of the same colour with the wings, and the eyes are prominent and black, only the pupil is white.

12. The BUTTERFLY, *with an ash-coloured body, with a black tail*, is of the same shape with the former, but the black back has a silver cast, and the long wings are of a dusky colour, spotted with black. The lower wings are of a dull yellowish colour. Both these are extremely swift in flying, and more so than any other insect of this kind, except that which follows.

13. The BUTTERFLY, *with white wings, marked with five or six dusky spots*, has the middle of the back, which is yellow, marked with a spot as black as jet, and on each side there are two downy tubercles. The rump is covered with a sort of blackish down, and the shoulders are of a yellowish moss colour. It flies more wiftly than any bird.

Of the *small* BUTTERFLIES there are,

1. That *with a blackish body, and branched feelers,* which has the internal wings of a deep red, and the external of a bright purple, variegated with red and black.

2. The BUTTERFLY, *with a speckled dusky body,* has three purple feet on each side, and a curled snout. The base of the wings is of a silver colour, which turns to a blueish purple on the other parts; and the upper are adorned with two whitish black studs. There are four small feelers on the head, besides two others that are very long.

3. The BUTTERFLY, *with wings full of eyes, and coloured like a Peacock's tail,* makes a very beautiful appearance, especially when beheld in the sun. It may easily be distinguished from all other Butterflies, by the beautiful variegations and colours of the wings.

4. The BUTTERFLY, *with a body variegated with dusky and white streaks,* has a greenish-blue shining head, and coal-black eyes, with exceeding white pupils. When it is flying, the wings seem to be of a dull purple-colour, mixed with a lively blue; but the insides are adorned with eyes, which are not very beautiful.

5. The BUTTERFLY, *with a grey body,* has the upper wings of a brightish green at the roots, and in the middle of a yellowish grey; but the lower wings are of a blackish green at the root, and the other parts white; their insides are variegated with an unpleasant green, and the eyes are blackish, as well as the head and feelers.

6. The *Asp-coloured* BUTTERFLY, *with bunched shoulders,* has a body full of joints, with narrow wings of a dark-grey colour, variegated with blood-red spots, but the feet, head, and feelers, are of the same colour with the body.

7. The BUTTERFLY, *with faint yellow wings, variegated with dusky and green spots,* has exceeding black eyes, but every where else it is of a yellowish colour.

8. This sort has all the wings resembling sea-shells, that are variegated with white and brown, and they

are rounded at the extremities; but in the middle there are several irregular lines that meet each other. For a more extensive account of Butterflies, *see* Caterpillars.

The *nocturnal* BUTTERFLIES or MOTHS, as has been before observed, are much more numerous than the diurnal, and generally fly in the night, or at least when night is coming on. *Reaumur* divides them into seven classes, each of which contains several different species. Many of this kind have no trunk; and indeed some have no occasion for any, for they never eat during the short time they have to live. Among those that have trunks, some have them so extremely small, that they are hardly visible, and therefore they are placed among those that really have none.

In the first class of MOTHS are those that have a sort of prismatic feelers, which are of an equal diameter from the root to the end, and make, as it were, a curvilinear triangle. All this class have trunks. There are Moths in this class, that may be called drones, and many of the finest and largest of these insects belong thereto. The moth which proceeds from a Caterpillar, that feeds upon spurge, belongs to this class. The length and shape of their trunks serve to distinguish the species of this kind of Moths.

MOTHS, of the second class, have feelers consisting of conic threads, or rather those, that, from the root to the extremities, decrease insensibly in their diameter, and terminate in a pretty fine point. These, as well as the former, are provided with a trunk.

MOTHS of the third class have the same feelers as the former, but they are without a trunk.

The characteristic of the fourth class, is to have feelers with beards, as well as a trunk.

MOTHS, of the fifth class, have feelers with beards, but no trunk. These five classes are characterized by their feelers and trunks, and the species are distinguished from each other by the carriage of their wings. *Reaumur* divides them into ten different sorts.

The sixth class comprehends those whose females have scarce any visible wings. Among these are the Moths that have tufts near the head in the form of feelers.

feelers. The Caterpillars that *Reaumur* calls Surveyors, supply a great number of females of this class. These, as he observes, are better characterized than the former, because they have wings that somewhat resemble those of Birds; for they seem to be composed of real feathers. They are all very little; but the structure of their wings has caused *Reaumur* to think they deserve to be regarded. One of their characteristics is their having feelers like conic threads. They do not fly in the day time, though the metamorphosis of the Caterpillar proceeds in the same manner as those of diurnal Butterflies. There are three species of these, which may be readily distinguished from each other; for the first are extremely white, and commonly settle upon six legs, of which the hinder pair are longer than those before. The second species of feathered Moths is brownish, inclining to the colour of bright wood; they generally settle on the four legs that are placed forwards, and hold the last pair, which are much the longest, sometimes near the sides, and sometimes under the body, where they form a sort of tail, after crossing each other behind. The third kind of feathered Moths keep their wings always displayed, and these are always very small. They are of a brown colour, which is sometimes lighter, and sometimes deeper, mixed with small spots. This brown however has a golden cast, and each of the upper wings is composed of eight feathers; each of the lower of four.

With regard to the colours of Butterflies, there are some that have their wings all of the same colour, and others that have a pair of wings of a different colour from the other pair. The colours, on the upper part of the same wing, are also often different from those below. The wings of some are almost of the same colour, without the least mixture; while others seem to be composed of more than one. Some have a border of a different colour from the rest, and others have a few spots different from the colour of the ground. Some have spots that are round, and composed of different colours, clouded and disposed in different circular streaks, that have the same centre, and imitate the form of eyes. Others have their wings full of

spots of different colours, which are undulated in some, and radiated in others. Some have their wings as it were tinged with gold and silver, sometimes with great profusion and beauty; some look like mother of pearl, or have spots of the same; and others again have spaces in their wings that are almost transparent; in short, there is scarce any conceivable variety that is not to be found in the colour and shape of their wings. There are male and female Butterflies of every kind or species, which may be readily distinguished from each other; for, as among other insects, the females are larger and thicker than the males. The bodies of the male are more small and slender, and that of the females more thick and round. The back part of the first is more pointed than the others; however, this difference, in the diurnal Butterflies, is not so considerable as in Moths; for the females of some of these have a body as long again as the males, and thicker in proportion.

The females of a great number of Moths seem to have assumed that form for no other reason, but to fecundate their eggs, and to lay them: this is all that passes during the short time of their lives; for as soon as they deposite their eggs they die, without taking any nourishment, or seeking for any. Of this kind are the Moths that proceeds from silk worms. As for the male Butterflies, they are very lively and active, when they proceed from their aurelias; for they immediately fly about every where, as it were in search of the females. Of this sort are the Butterflies that are seen flying in the woods in swarms, in the open day, though they have all the other characteristics of Moths. Their females seem to be as sluggish, heavy, and idle, as these are light, lively, and active. They make no use of their wings, tho' they are large; for they are always at rest, and wait for the coming of the males. The male does not settle upon the female, but places his body by the side of hers, and though he is not so long, they cause however their hinder parts to meet, insomuch that the head of the male is generally about the middle of the body of the female. The male is generally of the right side, and the

the end of one of his wings covers the end, or part of the end of the wing of the female, by means of which disposition, their coupling is performed in obscurity. It continues for half an hour, and sometimes an hour; and the female begins laying her eggs as soon as this is over.

The females of these Butterflies, and those of many other kinds, as was just observed, make no use of their wings for flying; and the Moths of silk worms, as well male as female, do the same; but their wings are not so large as the former. During the coupling of some Butterflies, the body of the male makes an angle with that of the female, which is sometimes acute, sometimes obtuse, and sometimes right; but other Butterflies perform this in the same manner as most quadrupedes.

The eggs of the female Butterflies are disposed like a bed of chaplets, and the vessels that contain them are called, by *Malpighy*, the trunks and branches of the ovary, in which the eggs are formed, and where they increase. Each trunk, says he, contains above sixty-four; so that every silk-worm lays five hundred and forty eggs, or upwards. The eggs of great numbers of Butterflies are of the same shape as those of Birds, though some are exactly round, others like flatted spheres, and others again in the shape of casks, besides many other different forms. The colour of the eggs newly laid are whitish, or of a whitish yellow, and some of them shine like mother of pearl. But there are a great many other colours, as different sorts of blues, greens, and reds. The covering of the eggs, though solid, is thin and transparent, and in proportion as the Caterpillar grows within the egg, the colours change, and are distributed differently; only there are some that have a thicker covering, and these generally keep the same colour. Each egg contains only one Caterpillar; and these eggs are deposited upon plants and trees, whose leaves are proper for the nourishment of the Caterpillars when formed.

All the eggs of Butterflies are attached to the leaves by a sort of size or glew, and there is one

fort well known to gardeners, wherein this is very visible, and is often seen on the shoots of apple, pear, and plumb trees. These eggs are placed in the form of bracelets, consisting from two hundred to three hundred and fifty in each, and generally surround the shoot like a ring upon a finger. Some Butterflies secure their eggs from the injuries of the air, by covering them with a sort of hair on all sides, in such manner, that the eggs are not visible through them. Some of these nests are red, and others of a coffee-colour; and when the covering is taken off, the round eggs will appear, that shine like mother of pearl. Many Moths, and some Butterflies, make their nests in this manner, and particularly those of oak-buds, or more properly the eggs, which produce Caterpillars that feed thereon. We shall now proceed to particulars.

As the SILK WORM produces a sort of Moth, it will not be improper in this place to give an account of that curious insect. There are two methods of bringing them up; for they may be left to grow and run at liberty on the mulberry-trees, from which they receive their nourishment; or they may be kept in a place built for that purpose, feeding them every day with fresh leaves. The first method is used in *China, Tonquin*, and other hot countries; the latter in *Italy and France*. The Silk Worm proceeds from the egg laid by a Moth, which chuses proper places on a mulberry-tree to lay in, to which they fix their eggs with a kind of glew, that most kind of insects are provided with for different occasions. These eggs continue during the autumn and the winter, in the same places where they were laid; and the manner, in which they are situated and fixed to the tree, keeps them out of the power of the hardest frost, though it should kill the mulberry-tree itself.

The insect never proceeds from the egg till nature has provided its nourishment, that is, till the leaves begin to proceed out of their buds. When these appear, the Worms pierce the shells, and crawl upon the leaves, becoming larger by little and little, and after some months they lay upon the tree small bundles

of

of silk, which appear like so many golden apples, painted on a fine green ground. This method of breeding them is certainly the best for their health, and creates the least trouble ; but the changes of the weather in our climates renders it subject to many inconveniencies, which have no remedy. It is true, that by the assistance of nets, or otherwise, they may be preserved from the insults of birds ; but the severe cold weather, which often succeeds the first heats, as well as the rain and high winds, will destroy them all ; and therefore those that are willing to breed them here, must place them in a warm shelter, proper for that purpose.

They commonly chuse a room placed to the south, that the sun may shine through the windows that are well glazed, so as not to admit the least air. The walls must likewise be very well built, and the planks of the floors exceeding close, so as to admit neither mice nor birds, nor even so much as an insect. In the middle there should be four pillars erected, or four wooden posts, so placed, as to form a pretty large square. Between these there must be different stories, made with osier hurdles ; and under each hurdle there must be a floor, with an upright border all round. These hurdles and floors must hang upon pullies, so as to be placed or taken down at pleasure.

When the worms are hatched, some tender mulberry leaves must be provided, and placed in the cloth or paper in the box in which the eggs were laid, and which are large enough to hold a great number. When they have acquired some strength, they must be distributed on beds of leaves, in the different stories of the square in the middle of the room, round which a person may freely pass on every side. They will fix themselves to the leaves, and afterwards to the sticks of the hurdles, when the leaves are devoured. They have then a thread, by which they can suspend themselves on occasion, to prevent any shock by a fall. Care must be taken that fresh leaves be brought every morning, which must be strewed very gently and equally ; and then the Silk Worms will forsake the remainder of the old leaves, which must be carefully

fully taken away, without any worms upon them. Every thing must be kept very clean, for nothing hurts these insects so much as moisture and uncleanness. For this reason, leaves must be gathered when the weather is dry, and they must be kept in a dry place, to avoid being troubled with drying the leaves by the fire, or making all the Silk Worms fast, which will do a great deal of damage in a little time; for as these small animals have but a short time to live, they make use of every moment, and feed almost continually to the last metamorphosis, after which they live for some time without eating. When the mulberry leaves fail, they may be supplied with those of lettuce; but they will not relish the change of food very well, for which reason the silk will not be so good; and there will be a rupture in the thread, where the diet began to alter.

However, they must not live entirely without air; for it must be let into the middle of the room on a sunshiny day, and the floors must be kept quite clean, as well as the whole room; for these things, being well done, contribute greatly to their health and encrease.

The worm, after it proceeds from the egg, is extremely small, and of a black colour; but the head is of a more shining black than the rest of the body. Some days after they begin to turn whitish, or of an ash-coloured grey; afterwards its garment begins to be dirty, and quite stiff, and then the insect throws it off, and appears cloathed a-new. It then becomes large and much whiter, though it has a greenish cast. After some days, which are more or less, according to the different heat of the climate, or according to the quality of the nourishment, it leaves off eating, and seems to sleep for the space of two days; then it begins to stir, and puts itself into violent motions, becoming almost red as it were by the efforts it makes. Its skin becomes wrinkled, and falls off in plaits, and thus it gets rid of it a second time, and throws it on one side with its feet. All these changes are made in three weeks or a month's time, and now it begins to feed again; but appears like a quite different animal, in head, colour and shape.

In a few days time, it seems to fall asleep again, and when it awakes, it again changes its cloathing. It then continues feeding again for some time; but seeming at length to be weary of the world and its pleasures, it forsakes its food and company, and prepares a retreat for itself, building it with its own silken threads; that is, it weaves a small cell, of a very fine structure, and extraordinary beauty.

The SILK WORM has under its mouth two holes, from which proceeds a sort of gum; and these it makes use of as it were for distaffs, which continually supply matter with which it spins the silk. It fixes this gummy substance upon any thing at pleasure, which comes out at two drops at a time, and then it draws its head back, insomuch that it spins two threads at the same time; for the gum immediately loses its fluidity, and acquires a proper consistence to support and wrap up the worm in due time. Then it unites both the threads of silk, sticking them to each other with its two fore feet; and to fix it now to one place, then to another, it makes use of a sort of fingers that the fore feet are provided with; and thus it continues till there is enough spun for its habitation, which is placed in the most regular order; only on the inside there is a sort of down, which consists of those parts of the silken threads, that did not come to perfection. In this lodging the insect becomes a nymph, or a sort of cod, without head, feet, or any other distinct part, only there are several rings, which decrease towards their extremities, and which have some motion when they are pressed.

This Nymph contains the body of the Moth; that is, the wings, the feet, the eyes, the feelers, and every thing else, which however cannot be distinguished from each other while it continues in that state; but in fifteen days time they are all distinct from each other. However, to preserve the silk, they take care to kill the worm, by exposing it to the sun before the Moth comes to perfection; then they take away the down, and throw the cods of the silk into hot water, and stir it with a sort of rod, to take off the heads or beginnings of the silk; then they put it through

through small rings, to stop the cod from proceeding farther, when they fix the silk to wind it off. They generally take eight of the filken threads together, more or less, according as they would have the silk more or less strong. During this the cods are kept under water, till after the silk is wound off. However, they do not take off all, for the latter parts grow weak, and are of a bad colour. As to the length of the silk thus taken off, it has been found to have been nine hundred twenty-four feet, on one, and nine hundred and thirty on another; and yet one of these, though of so great a length, weighed but two grains and a half.

After what has been said, it will be worth while to take a view of the intestines of this animal, whose body consists of several rings, each of which has an elasticity or spring. It has also hooks to fix itself in any commodious place, besides a skull to defend the substance of the brain, from whence proceeds the spinal marrow that runs along the back of the Worm, from one end to the other. In the mouth they have two rows of teeth, which move to the right and left, and not upwards and downwards, as in other animals. The beating of the heart may be felt very distinctly, for which reason, we may conclude it is designed to circulate the fluids through the body. From the head to the tail there runs a kind of small cord or nerve, which may be called the spine, because it consists of knots, and contains a substance like that of the brain. This spine being placed in the middle of the body, throughout its length, supports the heart and the lungs. The heart is a pipe which runs the length of the Worm, which consists of several cells, if they may be so called, which are wide in the middle, and narrow when they unite again. The lungs are a double chain, which is extended on both sides, and is composed of several rings, which answer to the holes or pores on the outside of the body of this worm. It is through these holes that the air enters into the lungs, and assists, by its dilation and spring, the circulation of the chyle, or the fluid which nourishes the Worm. If a little oil be put on the head, the back, or the belly

Belly of this insect, it will not kill it; but if it be poured on the sides, it will stop up the pores that open to the lungs, through which the air enters; and then the Worm will fall immediately into convulsions, and expire, unless the oil be instantly wiped off. Between the heart and the lungs are the stomach and guts, which are surrounded with almost innumerable turnings and windings, and a small long bag, which contains a sort of gum of the colour of a marygold; and this is the matter of which it makes the silk.

The male and female Moths, which proceed from the Silk Worm, differ from each other in several respects; for the male is more lively, though not so large as the female, which may perhaps be owing to this latter's being full of a great number of eggs, which she lays in a few days time, and are of a straw colour; but, at the approach of spring, they become blueish, and at length of a greyish ash-colour. The feelers of the females are clavated, and of the others serrated; but their bodies are whitish, and nearly of the same shape, only the hinder part of that of the female is a great deal thicker. The external wings of both are marked with two yellowish transverse lines, one of which is near the body, and the other towards the extremities. The hinder part of the body is divided into several rings, and they both have large prominent eyes, which are blackish. Thus much for the Silk Worm.

The *largest* MOTHS have bellies of the colour of sand, as well as the inner sides of the wings; their eyes are blue, their heads livid, and between their eyes there are two dusky feelers, marked with transverse spiral lines, much like a rope. On the shoulders there is a sort of a scapulary, of a sandy colour, at the end of which there are two black spots, which run across each other, and may more properly be said to be one. The back is blue, and the two external wings very large, and variegated with white spots; the undermost wings are less, of the colour of honey, and marked with dusky streaks and large spots. The thighs and legs are large, of a dark colour, and are furnished with two black forked claws. It makes a
great

great noise when it flies, and is so little able to distinguish objects, that it will fly against shining rotten wood, and other things of that kind.

The second MOTH of the larger kind, though not quite so big as the former, is more beautifully variegated with colours, which are of the brightest sort, insomuch that some call it the queen of the Moths, as the former is said to be the king. Some have resembled its colours to pearls, jewels, and the like, the joints being so extremely bright. The body is covered over with a sort of a down, not unlike the fur of a martin, or rather of an ermine. The head is small, the eyes large and prominent, and the feelers are like two feathers, of the colour of box-wood. The four wings are large, and painted with eyes, not unlike those of a peacock's tail, for they consist of various colours; but that which may be called the pupil is black, though the other parts of it are tinged with circles and semicircles of white, black, yellow, and flame colours. The external wings are whitish from the roots to the edges, only they are marked with black veins and specks. The undermost wings are of a dusky colour, and have only one eye each, like those of the upper; but they are adorned with three borders, the first of which is plain, the middle one dentated, and they are both of a flame-colour; the outermost is whitish, and appears as if it were sewed on. The legs and thighs are very strong and hairy, and of the same colour as the rest of the body; in short, it is so beautiful, that no words are sufficient to describe it.

The third sort has a large hairy body, of a blackish colour, and each wing is adorned with an eye, of which the pupil is black, surrounded with a dusky circle, to which a white semicircle is joined. The wings are variegated with several marks of a violet-colour, and the outer borders of the wings are of an ash-colour, like that of an eagle. The head is very short and small, and the eyes placed on each side are black, only they have a white pupil; between these are two short slender feelers, of a dusky colour. It proceeds from a hairy Caterpillar.

The

The fourth sort has a large head, of a dusky colour, with two strait blackish feelers. The neck is adorned with a red spot, the breast is hairy, square, and brown; and part of the shoulders of a firey red; but the breast is of a violet-colour, and is divided into five or six black rings. The feet are as black as pitch, the wings brownish, and variegated with blackish veins lengthways.

The fifth kind has a whitish head, blackish eyes, and feelers of a yellowish colour; the external wings are long, and the colour consists of brown and white; but the undermost have a tincture of red. The shoulders are of a deep black, and the rest of the body is nearly the colour of a rose, with seven black circles, which meet at a whitish line, that runs thro' the middle of the belly.

The sixth has a hairy head and shoulders, and the external wings are of a dusky white, variegated with blood red streaks. The eyes seem to hang out of the head, and are of a blueish violet-colour; the internal wings are of a flesh-colour, and have an eye in the middle of each, with a black pupil, about which is a shining violet purple; the body is of the colour of hung beef, and is marked with six round spots as black as ink.

The seventh has white external wings, undulated and variegated with dusky spots. The neck is red, and seems to be surrounded with a sort of skin, which hangs down upon the back like a cowl. The head is red, with eyes of a pearl-colour, and feelers of a flame-colour. The undermost wings are reddish, and marked with three small black spots. The feet are red, as well as the belly, and it has seven furrows, of a deep red, running transversely.

The eighth is all over brown, except the extremities of the wings, which are of the colour of box-wood, as well as the middle of the feelers.

The ninth is like the former, only the outward parts of the wings are of a dark sand-colour. The feelers are broad, of a whitish brown, and the middle of the external wings is brown, only they are marked with a round white spot.

Th

The tenth is of the same size as the former, and is all over of a dusky white colour, except in the middle of the wings, which are marked with a spot that is altogether white; and the pupil of the eye is extremely black.

The eleventh has a buncy head, with slender feelers, and the body and outer part of the wings are of a clay-colour.

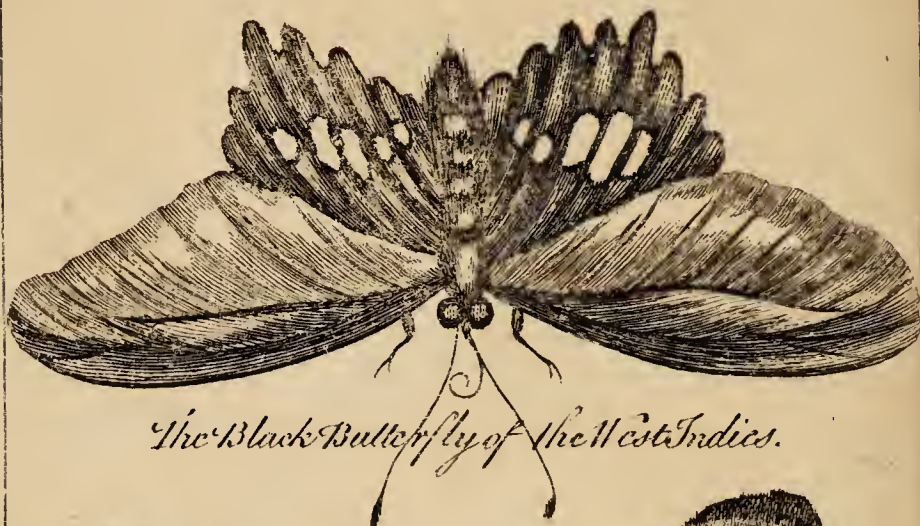
The twelfth is of a sort of an ash-colour, with black wings, a little spotted, and the eyes are extremely black, with a white shining pupil.

The thirteenth has very short feelers, and the whole body yellowish, except the eyes; and the wings are whitish.

The fourteenth is of several colours, and the feelers, which are black, seem to be composed of a great number of joints; the eyes and feet are also black. The shoulders seem to be adorned with a sort of feathers, five in number, of which one on each side, next the middle, is marked with three black spots. The wings are white, and variegated with yellow, blue, and black spots; the body is of a blackish blue, and consists of several joints, which are whitish on the sides. It has a tail that it thrusts out or draws in at pleasure, which terminates in a sharp point, and is of a yellow colour, with articulations. The whole body seems to be sprinkled with powder, and it lays a great number of yellowish eggs, which proceed from the abovementioned tail; and after it has laid them, it draws it in.

The fifteenth has two slender black feelers, a hairy head, and shoulders of a brown colour; but the neck is red, adorned with a sort of necklace or ring, and the thighs are also reddish. The extremities of the external wings are undulated with brown and white, and the internal are quite red, except where there are black spots. The body is of a light red, only on the borders there are six black spots placed in a circle.

The sixteenth is a very beautiful insect, being of a blood-red colour above, and of a greenish yellow beneath. The lower part of the shoulders is adorned with five curious red lines or streaks; as are also seven spots



The Black Butterfly of the West Indies.



*The transparent Winged
Butterfly of the West Indies.*



*The Black and White
Butterfly from China.*



The Yellow Butterfly of China.

spots on the middle of the back. The wings are red, marked with transverse spots, or rather shades, which run in a line lengthways, and are terminated by another which is whitish.

The seventeenth, when the wings are close to the body, seems to be brown; but the underneath wings, when extended, are of a flesh-colour, only they have a blackish border near the edges. It has oblong horns, and a trunk which seems to be folded up. The shoulders are hairy, and marked with a sandy-coloured spot, as are the sides, and all the joints of the body.

The eighteenth has feelers variegated with black and white, but the head is as black as pitch, and the snout is crooked, turning upwards. The iris of the eyes are whitish, the neck crimson, the shoulders hairy, and seem to be covered with a black mantle; the external wings are variegated with black and white stripes; but the undermost are red, only they are adorned here and there with black spots. The body is of a deep black, as well as the feet, and on each side of the body there are seven blood-red spots. There is another a-kin to this, which has feelers of a deep black, and the middle of the shoulders streaked with a pearl-colour; but in other respects it is much the same. All these are of the large kind.

MOTHS *of the middle size*, are,

1. All over whitish, only the external wings are marked with a few black spots; but the internal are speckled with red, not unlike the small-pox when they first appear, only the middle of each is whitish. The eyes are exceeding black, but the feet and feelers are of a sort of yellow. Instead of a nose it has a hair, which seems to be turned much like a cork-screw.

2. The body of this is all over hairy, and of a chestnut colour, as well as the external wings; only these last are adorned alternately, with black and white borders, and a yellowish eye. The feelers are yellow, and speckled with black; the internal wings are of the colour of a marygold, only they have eyes and borders like the uppermost.

3. This has four wings, the outermost of which are embellished with blue lines, which run lengthways,

ways, upon a dusky ground, and are marked in the middle with two round blackish spots. The line that runs along the edge of the wings is of a yellowish colour, as well as the feelers; but the body and head are blackish. The eyes are exceeding white, and the shoulders and sides are adorned with four black lines on each side, that run obliquely.

4. This has two feelers of the colour of a crane, and the body is black, with grey sides; the wings are yellowish, and marked with many black spots, not unlike those of a serpent, being broadish above, and roundish below. The edges of the wings are dentated and thorny, like those of Bats, and are of a black colour, and near them there are six pearl-coloured spots on each side.

5. This is of a fire-red colour, only there are whitish red spots on the surface of the wings.

6. This has coal black feelers, and a body with white eyes. The undermost wings are also of a black colour, but the uppermost are adorned with gold-coloured hairs and spots; as also with other broad spots of a black colour, with a silver speck in the middle; the outermost wings are variegated with crooked streaks, as black at jet, and beneath them there is a gold colour, which gives them the appearance of embroidery.

7. This has broad feelers, and a body of a greenish black colour; the roots of the wings are reddish, and the other parts are yellowish; only on each wing there seems to be a sort of a square black plate, which looks as if it was laid thereon; but their extremities are marked with a shining gold-coloured line.

8. This has four bran hed feelers, two of which are very long and broad at the extremities. The body is like that of the former, and the wings are of an ash-colour, chequered with black; likewise on the outer edges there are spots of the same colour, placed at equal distances.

9. The head, eyes, feelers, body, and internal wings of this, are of a sandy, or almost gold colour; but the shoulders and external wings are blackish, only there

is a very black stripe runs near the extremities, adorned on each side with ash-coloured lines.

10. This has a yellowish body, with a few black spots from the neck to the tail on the back and sides. The eyes, feelers and feet, are of a jet-black, and the external wings white, with yellow borders, and large narrow black spots.

11. This seems at first sight to be of a milk white colour, only there are black specks here and there, which give this insect a very beautiful appearance. The shoulders are downy and whitish, and the back and body of a yellowish colour, consisting of several joints, and marked with eight black specks. The eyes are large and prominent, between which the hairy feelers arise. It flies by night in meadows and pasture-grounds.

12. This has such very long wings, that they rather hinder than help its flight, and the feelers are extremely short; the eyes are small, and as black as jet; but the rest of the body is whitish, with a sort of yellowish veins, and a little down here and there.

13. The whole body of this, except the black eyes, is of a blackish colour, and the feelers are long, the body hairy, and the wings of the same colour with the body, only near the edges they have a greenish cast, and shine like glass.

14. This is a beautiful species, though almost all the body is of a sandy colour. It has strong feelers, in proportion to the bulk of the body; these are of a black colour, and shaped like bulls horns. The eyes are black and large, the head short, and the neck thick. The external wings are adorned with irregular black specks, and the middle of the back is marked with five black spots, representing the heads of carnations.

15. The wings of this are almost all over of a sort of ash-colour, and it is entirely without feelers; the eyes are blackish, the back yellowish, and marked with five dusky specks.

16. This is of the same colour with the former, only there is a tawny transverse spot or stripe on the external wings. It is every where else of an uniform colour, except the eyes, which are black. It has a
long

long articulated body, and four long narrow wings, with six feet, of which the two hindmost are twice as long as the rest; the feelers are slender, but of a great length.

Of the least sort of MOTHS, one is of an extraordinary structure, having only four jet-black feet; the external wings are blue, and larger than the internal, which are yellowish; the body also is yellow, and so large, that the wings will hardly cover it. The feelers are full of specks, and the eyes, except the white pupil, are blackish; the head, and the trunk, which is long, slender, and folded up, are yellowish.

2. This is of a blue-green colour, and has a small body, and blackish feet and feelers.

3. This has the shoulders and wings of a greenish colour, but the body is of a yellowish-brown; the external wings are adorned with a white border, and whitish brown spots. The head is very little, and the feet and feelers are of an ash-colour.

In houses we often find a sort of MOTHS, of a small size, and of a silver colour, speckled with black, which fly about the candles. These are the first mentioned, that eat woollen-cloths and stuffs, and indeed the only ones amongst us, that are usually called Moths. The *Latin* name of the rest is *Phalæna*, and they are only called Months in *English*, for want of a more significant word.



C H A P. V.

Of Flies in general.

FLIES have transparent wings like gauze, on which is no dust, as upon those of Butterflies; neither have they any cases to their wings, which distinguishes them from those of the Beetle kind. All Flies have a distinct head, a corset, and a body; the corset is that part on which the wings are placed, and the body contains the guts, the stomach, and the parts of generation, with the greatest number of tracheæ, that is, the organs that serve for respiration. The head

head is connected to the corset by a very short neck, on which it will commonly turn round, as on a pivot. *Reaumur* observes, that some Flies have two corsets, distinct from each other, of which the first is smallest, and the other is that to which the wings are connected. The corset is the roundest part, and is generally strongest and thickest, though sometimes it is not so broad as the body. The *Formica Leo*, and some water Moths, are metamorphosed into Flies, that have a double corset. Many naturalists have confounded Flies with four wings, with those that have but two; besides which, they have often neglected to mention the number of wings; but *Reaumur* divides them into two general classes, that is, Flies that have two wings, and Flies that have four wings; and under these he comprehends four subordinate classes. The first class comprehends Flies that have a trunk, and have neither teeth nor nippers. The second is composed of Flies that have a mouth with teeth. The third consists of Flies that have a mouth furnished with teeth; and the fourth those that have both a trunk and teeth. Among those Flies that have a mouth and teeth, there are some that have not only teeth on the outside of the mouth, but within; and these might have been placed in a fifth class.

All sorts of Flies, that have two wings, belong to the first and second classes; for there are none of these that have the characteristicks of the two other classes. The great blue flesh Flies, and all those that are small, and are so troublesome in houses, as well as Gnats, are of the first class; there are also Flies that resemble Gnats, which have a mouth without teeth, and these belong to the second class of two winged Flies. The Flies with four wings, belonging to the third and fourth class, are very numerous; such as Bees which have a trunk, and two teeth above it, as well as all sorts of Wasps, which have a mouth and two teeth on the outside. Many sorts of Flies, with four wings, belong to the second class, such as papilionaceous Flies, which proceed from different sorts of water Moths. Many sort of Flies, with four wings, belong to the first class, as the Pucerons, called by some the

Vine-fretters, and others a-kin to them, as well as the Grasshoppers.

Reaumur has another sort, which constitutes a fifth class, and he calls them Heads in a trunk, because they have extremely long heads, from whence proceeds a very long snout, which is only open at the end. However, he means that the place where the heads of other insects terminate, in these are prolonged, so as to form the shape of a trunk, which is stiff, and never changes its form or position, without changing the head itself. It is at the end of this lengthened part, that the teeth are placed, or at least the instruments, by means of which these insects take their nourishment. One of this sort is the Scorpion Fly, so called, because the male generally keeps the back part turned up towards the back, like that of a Scorpion when it is about to sting. There is another beautiful Fly, which flutters about flowers, that is another instance of this kind.

Besides these classes, *Reaumur* establishes a second rank, subordinate to the first, and whose characteristics are taken from what appears at first sight. These classes, which are under the former, are characterized from the trunk, or from the mouth void of, or furnished with teeth, and having the head made in the form of a trunk. These are three in number, the first of which are Flies, with a short body, and more broad than thick; the second is those that have a long body, and the third is the Flies, whether long or short, that have the bodies joined to the corset by a single thread.

In order to characterize the kind of Flies, which ought to be placed under these classes, *Reaumur* particularly attends to the constant varieties which may be taken from the carriage of their wings, the shape of the feelers, the carriage of their trunks, of the other external parts of the body, and more especially from the hinder parts. Flies of different kinds may be considered while they are at rest, or while they are creeping, as well as in the different carriage of their wings, which is very evident in Butterflies. But there are more Flies that carry their wings parallel to the
plane

plane of position, than there are that keep them in inclined directions.

Among those that carry their wings parallel to this plane, some hold them like oars. Their direction is perpendicular to the length of the body, which is not covered by them at all. Of this kind are many of the long water Flies, and of those that have two wings, besides some kinds of Tipulæ. Other Flies carry their wings in such a manner, that they cover one part of the body, and not the other, whether the Fly has two wings or four, unless one of the upper wings sensibly intrenches upon the other upper wing. Among the Flies with two wings, the blue flesh Flies, and the common house Flies, are instances of this kind.

The wings of several sorts of Flies cross each other over the body, and when this is done, more or less, there arises differences easily to be observed. The wings of several Flies that cross the body, are roundish and are not exactly parallel to the plane of position. The wing that is the uppermost, is more elevated over the line on the middle of the body, than on the sides. Thus the wings of those are disposed, which proceed from bastard Caterpillars. Some Flies have wings placed on the back, one against another, and they are in a plane perpendicular to that of the position. Several sorts of small long water Flies, and several sorts of Pucerons, carry their wings in this manner. This is also observable in the Fly called the Ephemera.

The wings of several other Flies are applied obliquely against the sides, and meet over the body, at their inner edge, forming a sort of roof. Such is the manner of the small Lion Puceron. Other Flies have their wings likewise applied to the sides, but then they bend down over the back, making almost a flat roof, like many of the Flies, which in their first state were water Moths. Lastly, other Flies keep their wings obliquely to the plane of position, and in such a manner, that they meet under their bellies.

Other varieties in Flies proceed from the texture of their wings. They are generally like a sort of fine gauze, for they have every where a nearly equal tincture of transparency; however, the wings of several

sorts of Flies are not very transparent, and others are quite opaque; infomuch that, at a distance, they might be taken for the wings of Butterflies. These are also called by *Reaumur* Papillionaceous Flies, that have their wings half transparent. Among the Flies with four wings, there are the Papillionaceous, whose lower wings are very transparent, while the upper are a little opaque, which is observable in the Flies of several water Moths. Other Flies have opaque spots on their fore wings, on a very transparent ground; these may be seen in Scorpion Flies. There are also Flies with two wings, with dark spots thereon, separated by transparent spaces.

The feelers likewise serve to distinguish the several kinds of Flies from each other; for there is as much difference among the feelers of Flies, as those of Butterflies. In some sort of Flies the feelers are jointed, and as it were composed of several grains, placed upon each other like beads: these are generally thicker at the roots than at the extremities. Other Flies have their feelers composed of joints like the former, but then they grow thicker towards the extremities, and these are called clavated feelers, that is, they are like clubs. The Fly of the Formico-Leo has this sort of feelers. Several small sorts of Flies, as Gnats, and some of the *Tipulæ*, have feelers like feathers, and others again in the shape of prisms; but these are jointed, and more slender at their ends than at the middle. Some Flies have branched or forked feelers, being composed of two articulated parts, and so each of them seem to be double; but these are only found in some sort of Butterflies. Others have their feelers very short, but extremely thick, consisting of only two or three joints, and these are met with in many sorts of Flies with four wings. Likewise, the carriage of the feelers may serve for another distinction; as for instance, the *Ichneumon* Fly keeps the feelers in continual agitation.

Flies may also be distinguished by their trunks; for some have them simple, and others armed with teeth or nippers. Some again have a sheath composed of a single piece, while others consist of several pieces joined

Three Crane Flies, a Sort of Libellulæ.

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Two Horse Flies.

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joined together; some have scaly sheaths, and others have them fleshy; some are terminated with a sort of large lips, and others have none at all; but in many kinds, these varieties cannot be distinguished without a microscope. However, the carriage of the trunk may be plainly seen by the naked eye; for some fold them up when they are not used, and others, while they are in action, keep them turned downwards; as for instance, Bees and Drones; in short, others always keep them at full length, only they can turn them to different sides, as may be seen in Gnats, Grasshoppers, and the like. The shape of the head of all sorts of Flies are not alike, for some have them almost round, others broader than long, and of a less diameter before than behind. The Formica-Leones differ from the Pucerons, not only in their feelers, but in their double corslet. The corslet of some Flies is much higher than in others, insomuch that it obliges them to turn their heads downwards, and makes them appear hunch-backed. All Flies have but six legs, but they differ in the size in proportion to the body; for some have them very long, and others very short; as for instance, the Gnats and the Tipulæ seem to be mounted upon stilts. The legs of most Flies are joined to the corslet, but in some, one of the pairs is attached to one of the rings of the body.

Besides, the latter part of the body serves for another distinction of Flies; for some are armed with stings, and others have a sort of piercer, lodged in a case. Others are provided with a kind of a saw, which does not appear till the body is pressed. Likewise some have strings at their tails, as the Ephemera.

Most Flies are oviparous, that is, they lay eggs; but there are some that bring forth their young alive. Some herd together in companies, as Bees and Wasps, and others are solitary, being generally found single. As for the species of every kind, they have only slight differences, which are not so essential as betwixt the kinds themselves.

C H A P. VI.

Of flying insects with four membranaceous wings.

THE TENTHREDO is distinguished from others of this kind, by the female having a ferrated weapon or sting at the tail, and the worm from which it proceeds having several feet. *Linnaeus* distinguishes them into that with clavated feelers; that of the willow-tree; that of the poplar-tree; that of fig-wort; that of the rose; and that of the birds cherry-tree.

The *black TENTHREDO*, *with clavated feelers*, is nearly of the size of a Hornet, and the body is black and hairy, only the third, fourth, and fifth joints, are of an iron-grey. The wings are thin and transparent, and the legs black; but the feet are yellow within, and the feelers are yellow, except at the lowest joint, which is black. There are a few dark grey nerves in the wings, and the wings themselves are of a brownish tincture towards the outer edge. The worm it proceeds from is smooth and green, only there is a black list down the back, edged with yellow; it has twenty-eight legs, and often rolls itself up.

The *black TENTHREDO*, *with feelers that have eleven joints*, is of the size of a common Fly, and the wings have several veins; there are two black spots, on the uppermost of which, that nearest the breast is in the shape of a half-moon, but the other is round, and near it, towards the top, there is one that is white.

The *yellow-legged TENTHREDO* is not much larger than a Flea, though the slender feelers are composed of ten joints. The head and breast are black, and bunched, and the body is of an oval shape, of an iron-grey below, and black towards the vent. The wings are larger than the body, of a whitish colour, and without spots.

There are other species of the Tenthredo; but the accounts given us of them vary so little, and that only in their colour, number of joints, &c. that we apprehend they may with propriety be omitted here.

The ICHNEUMON FLY is distinguished from others, by having a weapon with three forks at the tail. The principal flies of this species are,

The *common* ICHNEUMON FLY, *with red legs*, has a long, slender, black body, and the head, breast, feelers, and weapon at the tail, are of the same colour; but the legs are reddish, long, and slender, and the wings are transparent, only there is a black spot near the edge. The weapon at the tail is longer than the body, and consists of three parts like hairs, the two outermost of which are black, and the middlemost red. It is called by *Ray* the Wasp Ichneumon, with a slender, longish body, and three very long bristles at the tail.

The *yellowish wasp* ICHNEUMON FLY, *with large wings*, is all over of the same colour, and the body is of a crooked shape, but narrow at the base; the feelers are equal to the body in length, and are composed of a great number of joints; the eyes are large and black.

The ICHNEUMON FLY, *with silver-coloured wings*, has an oblong black body, only it is of a blackish red in the middle, and it has two black feelers; the wings are marked near the upper edge with a blackish spot, and the legs are reddish; at the tail there are three long hairs, and it flies very swiftly. This is nearly like that first described.

The *whitish* ICHNEUMON FLY is all over white, except four black spots on the wings, of which the outermost are greatest, and the innermost least. It keeps its wings when sitting erect, and has six feet, whereof the four legs are fixed to the body, and the pair before, which are greater and black, take their rise close to the neck. It has two globous prominent black eyes, and two black short feelers. The body is slender, round, and as long as the breadth of a man's finger, and it has three bristles at the tail, as long as the body, which in flying it keeps of a triangular form. It appears in *May* and *June*, before and after rain. It uses the fore feet as feelers, and seems to extend them as such.

The ICHNEUMON FLY, *with silver wings and a black body*, has a forked and crooked mouth, or snout, and on the forehead there are two short horns or feelers. It has four legs or feet, and the pair under the breast are slender and short; but the rest below are stronger. The tail is oblong, with two short hairs, and another in the middle, which is much longer.

The ICHNEUMON FLY, *with a black body and tail*, has an oblong body, and two wings somewhat shorter than the body, with feet or legs of a saffron colour. The tail is equal in length to the rest of the body, and it is a very uncommon Fly.

The ICHNEUMON, called the COTTON FLY, because it makes a web of the substance of cotton, of the size of a pigeon's egg, and is common among the grass in the autumn.

The ICHNEUMON FLY, whose worm feeds on the flesh of the Caterpillar of the cabbage, being bred within its body.



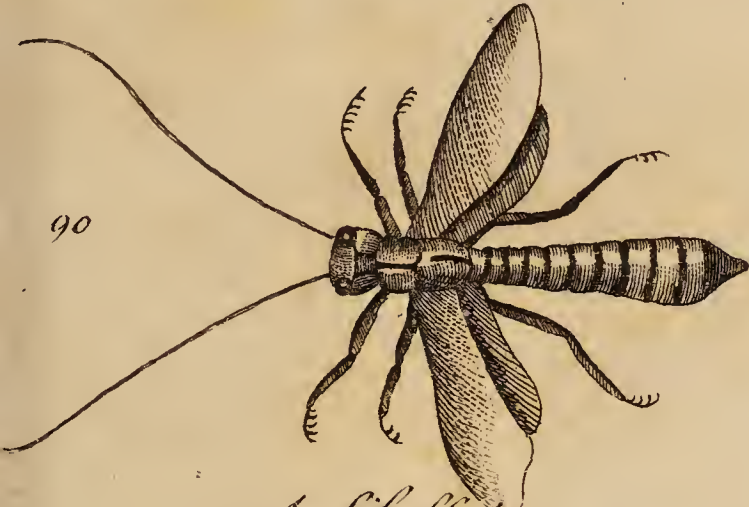
C H A P. VII.

Of Flying Insects with two wings.

THE BREEZE, or GAD-FLY, is of the size of a common blue flesh Fly, and has black large eyes, with feelers that consist of a long thread like a bristle, and the body is yellow, only it is surrounded with a black belt or stripe; the belly is of a tawny colour, except the last joint, which is black. The tail is long, bending under the belly, and the wings are whitish, and have a black line, with three black spots upon each. The female is said to lay her eggs in the backs of cattle, under the skin, where it lives in the state of a Maggot all the winter.

The grey FLY, or TRUMPET-FLY, is considerably bigger than the common blue Fly, and the body is of a duskey-grey colour, approaching to black; it is smooth, except about the breast, which is beset with a great number of yellow long hairs; the wings are large and transparent, the body oblong, and the
eyes

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A Libellula



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*Gad Flies,
or Beezes.*



A Libellula.

eyes large and black. The female lays her eggs in the nostrils of Sheep, Deer, and some other animals. It is called the Trumpet-Fly, from the noise it makes in the hot days of summer.

Linnaeus has four sorts of these Flies, to which he gives the general name of Oestrus; namely, the Ox-Oestrus, or Gad-Fly, the Oestrus that attacks the Rain-deer, the Nostril Oestrus, and the Hæmorrhoidal Oestrus. Others take notice of the larger Bee-like Oestrus, the smaller round-bodied Oestrus, the large black and yellow-bodied Oestrus, the black and yellow Oestrus, with black legs and transparent wings, the long-bodied Oestrus with long wings, which is said to proceed from a worm that is bred in the guts of horses. The large roundish-bodied Oestrus with plain wings, that is said to proceed from a worm bred under water, and is called by some the *Tabanus Aquaticus*. The smaller oblong Oestrus with a pointed body, the Oestrus with spotted wings, a variegated body, and short legs; the black and tawny Oestrus. These sort have a style with a head under each wing, and they are noted for making cattle run about the fields as if they were mad.

The HORNET-FLY is as big as a common Hornet, and is so like it, that one may be easily taken for the other. The head is large, the snout long and black, with a sharp point, and the eyes are prominent, the breast is large and bunched, and of a dusky colour, but the wings, legs, and belly, are of an iron-grey; the body on its upper part is black and yellow, and consists of seven joints, the three uppermost of which are black, and the rest yellow.

The WASP FLY is of the size of a common Wasp, and very much resembles it in shape and colour. The head is smooth and yellowish, the body blunt, and all its joints, at the edges, are of a pale yellow, and the snout is long, and pointed at the end.

The *Virginian* HORNET FLY is of the size of our largest Flies, and has a black head, with a silver line that runs from the shoulders to the mouth; it has large black eyes, a long and strong weapon on its mouth, the shoulders are of a blackish brown, and it has two

silver wings. At the back part are seven or eight joints, of a whitish colour, but the other parts are blackish, except the belly, which is of a yellowish ash-colour, with a greenish cast.

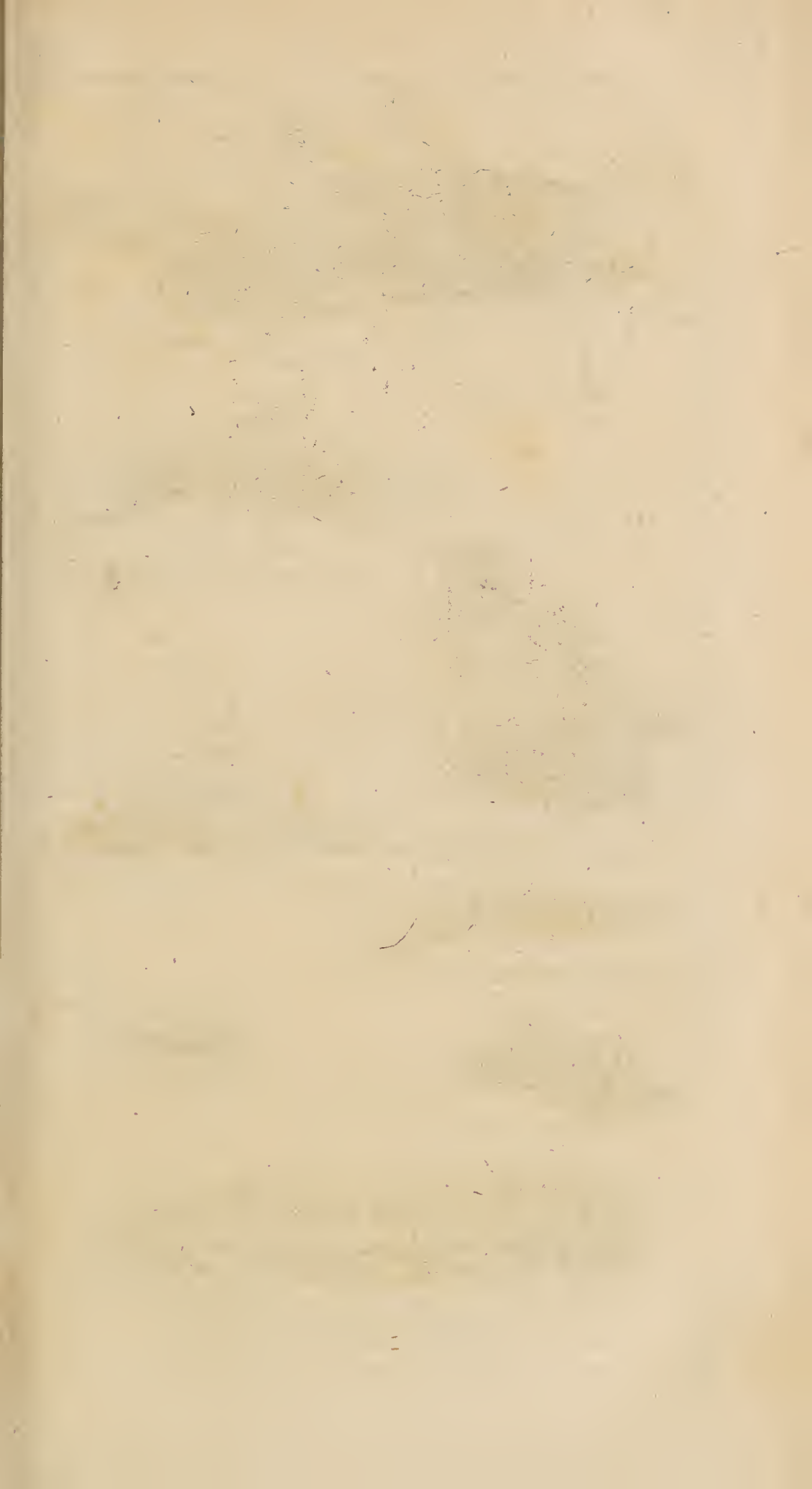
The *Muscovite* HORNET-FLY has a very long body, with oblong large eyes, that take up the greatest part of the head; the snout is black, hardish, and divided into three parts, with which it can penetrate through cloth, and hurt the skin of the person that wears it.

Linnaeus calls these sort of Flies ASILUS, of which he has four sorts, namely, the rapacious Fly, the hairy Asilus, the Asilus with round wings, and the Asilus that pricks the legs through the stockings.

Other authors have the long slender-bodied great Wolf-Fly; the great smooth black and red *East-Indian* Asilus; the black legged smooth yellow Asilus with blue wings; the Asilus with a blue body, variegated with black streaks; the black hairy Asilus, with brown legs and white wings; the Asilus with the body variegated with a black and reddish colour; the smooth Asilus with black wings and a black body; the black Asilus with roundish iron-grey wings; the black Asilus with white streaks and spots; the willow Asilus with white wings, marked with two transverse black streaks; the smooth Asilus with a black body and grey wings; and the smooth oval grey Asilus.

The *common* HORSE-FLY is pretty large, and has a body of an oblong shape, and rounded at the end; it is of a grey colour, and has a smooth skin, with large eyes, and large transparent wings. Each of its legs are terminated by four short and sharp claws, and it has a clavated snout, in the shape of a cylinder, it being blunt at the end, and the tongue is like a bristle.

The *Swallow's-nest* FLY is but small, and has a small head. The breast is somewhat in the shape of a cone, and the body is broadest at the extremity. The wings are long, but remarkably narrow, and the legs are all terminated with six short claws. The former of these are exceedingly troublesome to horses and cattle, and stick on firmly wherever they lay hold; sometimes they





The Locust. 63



The Burnet Moth. 137



The Common Butterfly. 102



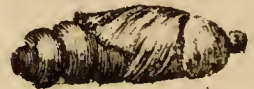
Caterpillar of the Burnet Moth.



Caterpillar of the Common Butterfly.



The Chrysalis.



The Chrysalis.



The Palmer Worm. 253

they will make horses almost mad: the last is frequently seen on the necks of horses.

Linnaeus calls these sort of Flies Hippobosca, and has only two sorts, namely, the common Horse Fly, and the Sheep Fly, or rather the Hippobosca without wings. Other authors have the long-bodied dusky-brown Hippobosca; the black Hippobosca with an oval body; and the Hippobosca with a round body and short wings. The snouts of these are all alike.

The *great* HORSE FLY has a greyish head, and large black eyes, with broad transparent wings, but of a dusky colour, marked with iron-grey lines. The breast and body are grey, only the back part under the wings is a little yellowish, and in the center of each of the rings, all the way down the back, there is a triangular white spot. The thighs are black, and the legs yellow.

The *East-Indian* HORSE-FLY is a most pernicious insect, and stings or bites most terribly. It is about two inches broad, and as much long, and of a brown colour, with a yellow streak along the body. They build their nests very curiously on the rafters of barns or out-houses, as the *East-Indian* Wasps do on the twigs of trees; in these they lay their eggs, and hatch their young ones; they feed upon fruit, and after they are killed have a most disagreeable smell.

The *green* HORSE-FLY was brought from *China*, and has the body and under wings of a fine shining green, which has the lustre of polished metal; the tips of their wings, and their under side, are dusky or black, but the upper wings are of a light brown, very thin and transparent.

The *purple and brown* HORSE-FLY is a native of the *West-Indies*, and the wings are of a dirty purplish brown, with some transparent spots thereon.

The BURREL FLY has an oblong body, which is divided into three principal parts, namely, the head, the shoulders, and the belly, which last has five or six joints or rings. It is all over of a whitish colour, inclining to grey, and has a strong, brawny, long snout. In *July* and *August* it is very troublesome to horses and cattle. *Mouset* gives us an instance of a horse that

was tied with a halter to a tree in a wood, where he was killed in six hours time by these Flies, which he supposed was owing to the great loss of blood, of which they are very fond.

Linnaeus calls these sort of Flies TABANUS, of which he has only two sorts, the common Tabanus, and the Tabanus that can see but very little; but *Ry* has one which he calls the beautiful two-winged Fly, with large white spots on the wings. It is of the size of the common House-fly, and has a brown head, breast, and body, only there is a yellowish tincture under the roots of the wings. The eyes are large, of a bright shining green, with a few black specks.

Other authors have the black TABANUS, variegated with yellow, and with brown legs; the brown Tabanus with iron-grey sides, and three brown streaks over the eyes; the grey Tabanus with a transverse line over the eyes; the brown Tabanus with grey wings, variegated with small white spots, with green eyes, and four brown lines running over them; the long-bodied Tabanus; the Tabanus with a short body and transparent wings; and the black Tabanus with transparent wings.

The FLY *with white wings, and a black spot on each*, has a large red head, and a short blunt black body, and black legs; the eyes are large, and while sitting, it is constantly shaking its wings; they are common in orchards upon apple-trees.

The HAIRY FLY is of a large kind, and has a body of a black oval shape, and its extremities are covered with a great number of yellowish hairs, as well as the breast. The head and legs are black, and the wings transparent, only they are whitest towards the base, and have each a large iron-grey spot towards the outer edge. This is not a very common Fly.

The black FLY is pretty large, and has a body of an oval blunt shape, the breast is oblong, the head and eyes large, and the legs are black. The sides are marked each with a very large pale-coloured spot, and the tail is beset with black hairs; moreover, the sides of the belly are covered with somewhat of a shelly substance.

The

The *green* FLY is as big as the blue flesh Fly, and has a black head, with large eyes; the breast and body are of a beautiful green, with somewhat of a brassy yellow case, which in some lights appears bright and shining. The legs are black, the eyes brown, and there is a double transverse line on the belly; the body is of an oval shape, and has four joints.

The *grey* FLY is not unlike the common House-Fly, but not half so large. The eyes are reddish, the breast grey, but marked with two smaller, and two larger black spots. The body is greyish, and consists of four joints. The first of which is without spots, but the second has a three-toothed mark at its base, and the third and fourth has spots nearly of the same kind. This is a very common Fly.

There are several sorts of these insects, that are properly called Flies, which we shall range under several classes. Of those that resemble the common House Fly, are,

1. The *common House FLESH-FLY*, with a black chequered body, and with oblong black streaks on the breast.
 2. The *black FLY*, with a white forehead.
 3. The *black FLY*, with a smooth glossy body.
 4. The *smooth black FLY*, with iron-grey eyes, and the base of the thighs whitish. This Fly proceeds from maggots in cheese.
 5. The *smooth black FLY*, with the edges of the wings blank, and thicker than the other part.
 6. The *somewhat hairy black FLY*, with nervous wings.
 7. The *grey FLY*, with fine black marks on the breast, and three toothed spots on the belly.
 8. The *yellow FLY*, with the belly brown on the upper part, and three black streaks on the breast.
 9. The *yellow FLY*, with black eyes.
- Of the shining or gilded FLIES there are,
1. The FLY, with a shining blue breast, and a shining green body.
 2. The FLY, with a shining green breast, and a shining blue body.
 3. The FLY, with a black breast and green body.
 4. The FLY, with a black breast and blue body.
 5. The

5. The FLY, *with an oblong body, of a copper-colour, and a green head, a yellow breast, and the wings marked with a brown spot.*

6. The oblong FLY, *with a brassy breast, and the body yellow on the fore part, and black behind.*

The FIRE-FLIES, of the *East-Indies*, are about an inch broad, and as much in length, or longer; the head, which is brown, has two small horns or feelers, and the neck is red. They have four wings, and so do not properly belong to this class; the uppermost of these are hard and brown, and those underneath soft. The shining substance is contained in a black bag on their backs, which they hide with their wings when they sit. In the rainy season there are prodigious swarms of them among the trees, and they feed chiefly upon their blossoms. There are several sorts of these Flies in the *East-Indies*.

The *West-Indian* FIRE-FLY, *Pere du Tertre* affirms, is like a living star, of which there are great numbers that in dark nights make the air seem full of curious lights, which shine and sparkle more than the stars in the sky. They do not shine at all in the day, and therefore are never taken notice of by any that are unacquainted with them. They have somewhat of the appearance of dirty Beetles, and delight to be among rotten wood till the sun is set, and then they fly here and there, seeming to be so many lighted candles carried in the woods and houses by invisible hands. They will pursue the light of a candle, and other things that sparkle or shine, with so much ardour, that they often kill themselves, like our Moths, especially if a burning coal is laid in their way. He tells us very gravely, and no doubt with some truth, that the poorer popish clergy, when they want candles or oil, catch one of these Flies, by whose light they will be able to read their matins as easily as if they had a lamp. While they are alive and in full health, a flame seems to proceed from all parts of the body; but when they are sick, it grows weak, and when they die, it is quite extinguished. When they are caught, they live but fifteen days, or three weeks at most.

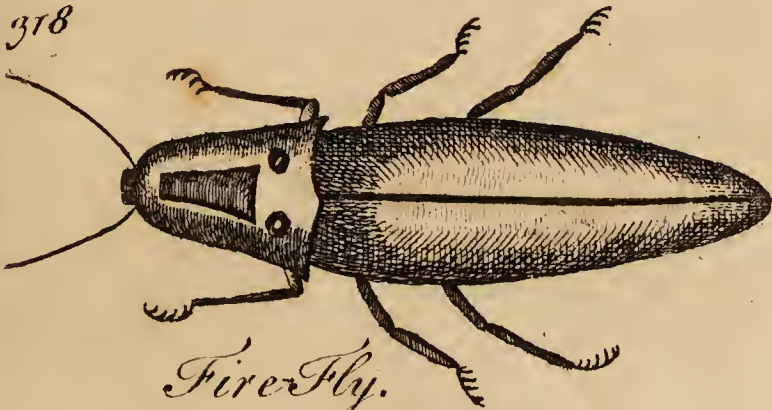
The

140



Fire-Fly.

318



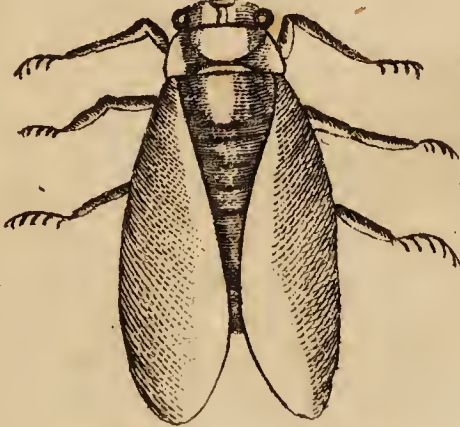
Fire-Fly.

34



A Dorr.

67



A Sort of Grasshopper.

The FIRE-FLY of *Martinico*, mentioned by *Pere du Tertre*, is not so large as a common Fly. They yield a sort of a sparkling golden light, which is extremely agreeable; but they will often hide it for a little while, and then begin to shine again; and thus they continue all the night. This shining resides in a sort of white substance, of which they are full, and they can make it appear through the chinks of their skin, when they please.

Of FLIES, which in a worm state feed upon trees, and plants, and the insects thereon, are these,

1. The FLY, with a black oval body, with two marks in the shape of half-moons, and three yellow belts.
2. The FLY, with an oval body, and three pair of whitish half moons, called by authors, the Elephant's Trunk. It feeds in its worm-state, on the pear tree.
3. The oblong yellow-bodied FLY, with black transverse lines.
4. The oblong yellow-bodied FLY, with three pair of yellow spots.
5. The long-bodied FLY, with six three-cornered yellow spots.
6. The FLY, with the body in the shape of a cylinder, with six spots in the shape of half moons, on the back.
7. The grey FLY, with four black spots on the back.
8. The oblong-bodied FLY, whose hinder legs are largest.
9. The FLY, whose body is marked with three yellow circular lines.

Of FLIES that have variegated bodies, there are,

1. The black FLY, with the bases of the wings of an iron-grey.
2. The FLY, with a grey breast, and the base of the belly marked with a yellow spot, and having the edges of the segments whitish.
3. The black FLY, with all the segments of the body, except the first, yellow, and a black mark in the middle.
4. The FLY, with a yellow breast, with four yellow transverse lines on the belly-part, the first being larger than the rest, and interrupted.
5. The FLY, with four yellow streaks on the breast, and three of the segments of the belly-part yellow.
6. The

6. The *black FLY*, with a white body, and two black streaks thereon.

7. The *brown and somewhat hairy FLY*, with the edge of the belly sharp, and having three yellow lines, with a triangular spot.

8. The *BEE-FLY*, produced from the long-tailed maggot of necessary houses. The black Fly with a velvet body, marked with three transverse lines.

9. The *black FLY*, with two yellow belts on the back.

10. The *black FLY*, with iron-grey wings, and three white interrupted belts on the back.

11. The *brown FLY*, with iron-grey wings, and the edges of the segments of the body grey.

Of the hairy FLIES, there are,

1. The *black FLY*, with the edges of the wings thin, scalloped, and whitish.

2. The *common hairy dung FLY*, with a spot on each of the wings.

3. The *black FLY*, with the base of the belly-part white, and its extremity brown.

4. The *FLY*, with a grey breast, and the point of the belly-part white, and the wings marked with an iron-grey spot.

5. The *FLY*, with a grey breast, and a black body, having a dusky iron-grey spot on each of the wings.

6. The *FLY*, with a white body, except behind, where it is black, and having white wings, marked with a black spot.

7. The *FLY*, with a yellow breast, and a brown spot on the wings.

8. The *grey FLY*, with iron grey wings, and a brown spot on each.

Of FLIES that have variegated wings, there are;

1. The *FLY*, with black wings tipped with white.

2. The *FLY*, with two black spots on each wing.

3. The *FLY*, with white wings and a single black speck on the extremity of each.

4. The *unguiculated winged FLY*, with white wings, and a black spot in the middle.

5. The *black FLY*, with the wings variegated on the fore part, with black and white.

6. The *FLY*, with grey wings, spotted with black.

7. The

7. The grey FLY, with unguiculated wings, spotted with brown.

8. The FLY, with white wings, whose edge are black, and marked with black spots.

9. The FLY, with white wings, and three brown specks, and a brown spot at the end.

10. The FLY, with white wings, marked with four grey streaks; and as many smaller, running alternately between them.

11. The FLY, with white wings, marked with four streaks, and having five pair of spots on the back.

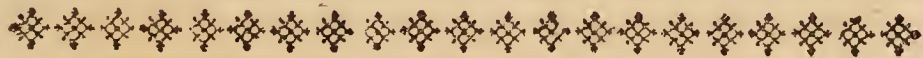
12. The green-eyed FLY, with white wings, and marked with the letter S, in a double line, of a brown colour.

13. The FLY, with white unguiculated wings, marked with four brown streaks, and having the extremity of the breast yellow.

14. The FLY, with pale wings, marked with black veins, and two transverse undulated brown lines, and brown tips.

15. The FLY, with membranaceous wings, spotted with black, and three rows of black specks on the body.

Linnæus has only eleven sorts of these FLIES, namely, the Water-Fly, the Summer-Fly, and the Cherry-tree Fly; these have variegated wings; the dung hairy Fly; the wonderful Fly; the putrid Fly; and the Fly of the necessary-house. These three have variegated bodies. The Elephant's Trunk Fly; the flesh Fly; the house Fly; and the Fly that is bred in cheese.



C H A P. VIII.

Of Insects of the BEE or WASP kind, that have stings in their tail.

EVERY swarm consists of three kinds of Bees, the most numerous of which are the common sort, whose business it is to gather the honey and wax. These may be called the labouring Bees, and, according to the most curious observers, they are neither male.

male nor female. The second sort are the drones, and these are males. Of the third sort, there is generally but one, which was commonly called the king, but is now known to be the queen; for it is a female, and is always the mother of a numerous posterity.

A Bee consists of three parts, namely, the head, the breast, and the belly. The head is armed with two jaws and a trunk. These jaws, or rather nippers, play in opening and shutting, to the right and left, and are used instead of hands, to take up the wax to knead it, and to throw out whatever is useless. One of these is as long again as the other, and the longest is a little thicker on one side, but becomes less gradually to the other end; it is a little crooked or bent about the middle, and is surrounded at the base with four hollow branches, like the pieces of a reed cut into four parts; the other is more thick, but very short, with branches that are hardly visible, they being very close to each other; in the first there is a trunk designed for labour, and in the second there is another, folded up in its sheath; and by the first trunk, a Bee can gather more honey in a day, than a hundred chemists in a hundred years. It is long, pointed, supple, and moveable every way, and the Bee can thrust it to the bottom of the cup of the flower, notwithstanding the leaves and the stamina are in the way, where it sucks out the honey, and carries it to the hive. But as this trunk, if it were always extended, would be incommodious, and might be broken by a thousand accidents, it is composed of two pieces, united by a spring or joint, in such a manner, that after it has performed its work, it may be shortened, or rather folded up, and so preserved from danger, by the help of four strong scales, two of which lie immediately upon it, and the two others, which are larger, and more hollow, cover them all.

The middle of the body of the BEE, or corslet, is furnished with six legs or paws, and four wings, of which two are large, and two small. It is all over covered with hair, that serves to retain the particles of wax, which fall from the top of the stamina to the bottom of the cups; at the end of which claw there are
two

two small hooks, which, by the help of a microscope, appear to be like two sickles, proceeding from the same handle, having the points opposite to each other. These crooked nails, which are useful to support the Bee upon many occasions, lie upon two spongy cushions, to render their common walking more soft and easy.

The belly of the Bee is joined to the corset by a thread, and is divided into six rings, which sometimes shorten the body, by slipping one over another; the inside of the belly consists of four parts, the intestines, the honey-bag, the venom, and the sting. The intestines serve for the digestion of the food, as in all other animals, and the honey-bag is as transparent as crystal, containing the honey that the Bee has sucked from the flowers, of which the greatest part is carried to the hive, and poured into the cells of the honeycomb, and the remainder serves the Bee for nourishment; that in the hive being to serve for winter provision. The bladder of venom, or gall, is at the root of the sting, of which the Bee lets fall some drops through a pipe, into the wound made by the sting, that it may have a worse effect. The sting is composed of three parts, namely, of the sheath and the two darts; the sheath terminates in a very fine point, only there is an opening a little below it, thro' which the venom passes. Both the darts have several small points or barbs, like those of a fish-hook, which render the sting more painful, and hinder the darts from slipping out again; or at least not without much difficulty to the Bee. The sheath itself has a sharp point, and makes the first wound, which is followed by that of the darts, and the pouring out the venomous fluid. This sheath is connected to pretty strong muscles, by which it is drawn back, unless the sting sticks too fast, and then it is drawn out of the body of the Bee along with it. The pain caused by the wound is attended with a little swelling, which will continue several days, unless the sting be immediately taken out.

The DRONE may be distinguished from the working Bee, not only by the trunk, the teeth, and the eyes, but by the corset, which is more hairy than that of the common Bee, and the rings of the belly are

are more smooth. Besides, the hairs of the brushes of the hind feet are more crowded together, and shorter. The body is generally larger and longer, by about a third part, and the head in particular is more round, and more full of hair. Add to this, that at certain seasons, there are two fleshy horns behind, about a third part as long as the body, and sometimes longer; and between these horns there is a fleshy substance, which rises upon the hinder part of the body, and is crooked like a bow. The inward parts are also different, for he has no sting, and within the body there is little else but thick, white, crooked vessels, that are pretty solid, and contain a milky fluid. They have a honey-bag, indeed, like the rest; but there is no small pipe or canal, which runs from the bag to the neck, by which means, the common Bees deposit their honey in the magazine; for if you press a Bee never so little, the honey will come out by this pipe, which it will not do in the drone; and consequently it brings nothing to the common stock. It is well fed, never works, nor goes into the fields, but wanders about the hive at full liberty. Its having no sting, perhaps may be owing to the want of an enemy to defend itself against. However, it appears, that the drones are designed only for the multiplication of their kind; therefore when the summer is past, and the queens have done breeding, the other Bees use the drones ill, and drive them away from the hives, that they may not be a burthen to the rest, since they then would do nothing but eat. They likewise fall upon the young drones that are not yet hatched, pull them out of their cells, kill them, and throw them out of the hives. It is to no purpose for the drones to struggle, for if they will not go away freely, they take them by the wings and shoulders, and thrust them out, leaving only a very few behind, and those of a small kind, that they may not devour too much of the honey, and these are kept only for the next year's use; for this is observable, that the queen is full of eggs in the beginning of the spring, though the drones are then not much different from other Bees in size. As for the drones that are driven away, they either die with hunger, are
killed

Queen Bee.



Drone.



Working Bee.



Females



Females



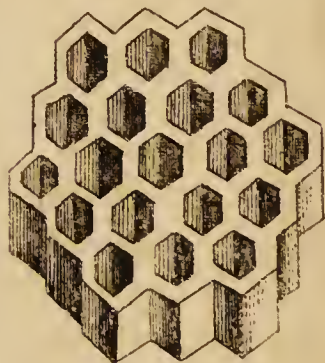
Working Wasp.



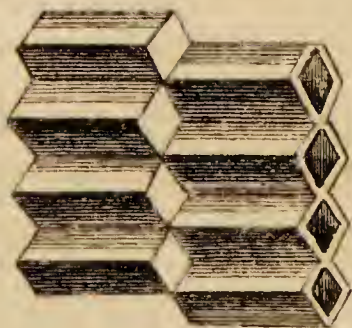
Males



Comb.



Comb.



killed by the rain, or are devoured by birds; and sometimes the ground will be almost covered with them near the hives.

The QUEEN is longer, but not so thick as the Drone, and the wings are very short, in proportion to the length of the body; for they scarcely cover it half way. The trunk is much shorter, and more slender, than that of the working Bee; but longer and thicker than that of the Drone. The corslet is brown, and the rings of the belly are of a deep chestnut-colour. The sting is much larger than that of the common Bee; but instead of being strait, turns back a little towards the belly, and the bladder of venom is proportionable thereto. Her eggs are distributed into two ovaries, one of which is on the right side, and the other on the left. Each ovary is an assemblage of vessels, all which terminate in a common canal, and they are full of eggs at the time of breeding.

The ancients were of opinion, that the generation of Bees was occasioned by putrified substances, and not in a manner analogous to that of other animals. Some who have built their faith too much on what *Virgil* has said in the fourth book of his *Georgicks*, in the fable of the shepherd *Aristæus*, and have taken a bull of two years old, have stopped up his nostrils, and afterwards killed him, and so left him to putrify. But this procedure was so far from producing swarms of Bees, that they only met with thousands of maggots, and a dreadful stench. Others have published variety of fictitious stories, to acquaint the world in what manner these insects generated.

During the greater part of the year, there is but one female in every hive, which may readily be distinguished from other Bees, by the shape of her body, as was before observed; but it is somewhat difficult to find her out. The males, who may be seen by hundreds, spend almost their whole lives in company with the female. For this reason, they are seldom out of the hive, but they lie idle therein, doing nothing at all but feeding upon the honey, which the working Bees have gathered. A single Bee is sufficient for stocking the whole hive, for she is most amazingly fertile,

tile, and on her alone depends the hope of a future progeny. It is certain, that all the Bees leave off working, and take no farther care of futurity, after the death of the queen. Besides, if any other female Bee be put in among them, she is immediately acknowledged for queen. The life of all the rest, is nothing in comparison of her's. They do her all manner of services, and pay her all the homage, that is due from subjects to a sovereign: for she never goes abroad, without a numerous guard; they keep her body clean with their trunks, and follow her wherever she goes. In short, the life of the rest of the Bees depends upon that of the queen, for in a few days after her death, they will all suffer themselves to die with hunger.

The working BEES are always very provident in providing cells for the young; and will leave off their common employment, to construct proper receptacles for the eggs. They build, purposely, little cells, of a roundish oblong shape, and extremely solid, and employ great plenty of wax in this work. This position is greatly different from that of the other combs: these sort of Bees know, or at least appear to know, what number of eggs the queen lays in a year, from whence proceed other females, that give birth to several thousands of the working Bees, and several hundred males. Sometimes they lay but three or four at first, and sometimes none at all; but in this last case, the hives produce no swarms. The fecundity of this Bee is such, that in seven or eight weeks time, she will produce 10 or 12000 Bees and upwards. Generally speaking, she lays but one egg in each cell, because it would not be sufficient to hatch any more. In two or three days time, according to the heat of the weather, the egg will appear hatched at the bottom of the cell. It has the appearance of a kind of maggot, which is always white, and placed in the same attitude, that is, rolled up like a ring, lying softly in a bed of a kind of gelly, of a whitish colour; and this is what the broods feeds upon. The common Bees are a kind of nurses to the brood, and have greater affection for it, than the hired nurses among mankind. They take great care in visiting each cell, and in examining whether any thing is wanting. They
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are fed with honey and wax, prepared in the bodies of the Bees ; and in less than six days time, the worm comes to its full growth. When the Bees perceive that the worms have no farther occasion for feeding, they shut them up in their lodgings, and wall them up, if the expression may be allowed, with wax. Then the worm continuing in a state of perfect rest, begins to grow larger, and lines the walls of the cell with silken tapestry, which they spin in the same manner as Caterpillars, before they undergo their last transformation. But it is observable, that the Bees bring them more nourishment than they are able to consume. Before they spin their covering, they eat up all their provision of gelly, leaving the bottom of the cell clean and dry. In a day's time, or longer, they obtain their full growth, and then they cast off their skins, which served them in their worm state, and become an Aurelia or Nymph. The worms that produce Drones, are of the same size as those of the working Bees. These last take care of them with the same application ; and it may well be imagined, that they are not less attentive to those which are to be metamorphosed into female Bees ; for it has been observed, that they supply them with nourishment in greater profusion.

When all parts of the Aurelia have acquired the consistence proper to the parts of the Bee, then that which is to appear opens its prison, by piercing with its teeth the waxen cover about its middle. The Bees then flock about it, and seem to express their joy, that they are going to be metamorphosed ; and this they discover by their good offices. Two or three of them lick and clean all its sides with their trunks, and some of them feed it with honey. Others again begin immediately to cleanse the cell that has been just left, and carry away the filth out of the hive. As soon as the external parts of the young Bee become dry, it begins to discover what employment it is to have during life ; for it immediately proceeds out of the hive, and goes in quest of flowers ; and is not at all at a loss to find its way back to the common habitation. After this first sally, it begins sometimes to gather the powder of the stamina ; and *Maraldi* assures us, that he has

has seen one of these, on the very day it came into the world, return back with two large balls of this substance. When the Bees first begin to break their prisons, there is generally above 100 of them in a day; insomuch that in the space of a few weeks, the number of the inhabitants becomes so great; that the hive cannot contain them; and then they begin to sally out in swarms. Young Bees are the brownest, with white hair; and the old are of a lighter colour, with red hair. The swarm is made on purpose to seek out a new settlement; at the head of which is the queen; for one of these is sufficient to conduct the whole swarm. About five or six days after the birth of a female Bee, she is ready to lay her eggs, and consequently is in a condition to place herself at the head of those that are disposed to follow her.

While the BEES have room enough in their hives, they remain quietly together; but when it becomes too little, then the old Bees continue in them, and the young sally out to go and seek a new settlement; if they should refuse, a bloody battle would ensue, and therefore the young ones are generally wise enough to submit. The young Bees thus going out to seek new quarters, have always a queen at their head; and they fly about, buzzing in the air, all in a company, pretty close together, till perhaps they settle on the trunk, or the branch of a tree, or in the large hole of a wall, or in some hollow tree, or hive, which the country people seldom fail laying in their way, after they have rubbed it with thyme, or other odoriferous herbs. When they move from place to place, the queen always leads the way, and enters first into the hole they design for their abode, and all the rest follow her. The owners often let them know there is a lodging provided for them, by the sounding of a bell, or of a brass kettle, which makes such an impression upon them (for perhaps they take it for thunder, which will be followed by a great storm) that they immediately consider with attention the place that is provided for them, and they immediately enter in. Then some one takes up the hive very gently, and places it upon a bench, or some such thing, where the bottom may be so close, that no insects

fects, or vapours from the ground, can enter in. There is always a small hole left at the bottom of the hive, for them to go in and out.

The substance they build their cells with, is nothing else but the wax which is gathered from the different sort of flowers; and the design of their work is a lodging for themselves and their young. When they begin to work in their hives, they divide themselves into four companies, one of which roves in the fields in search of materials, and the others employ themselves in laying out the bottom and partitions of their cells; others make the inside smooth from the corners or angles, take away the superfluous wax, and bring the work to perfection. The fourth company bring food for the rest, that they may not leave their work; but they give nothing to those that go into the fields in search of wax, because they may provide food for themselves. They often change their employment, those that have been at work, being permitted to go abroad, and those that have been in the fields already, take their places; and doubtless these sort of changes is a great alleviation to their labour. They have some sort of signs by which they understand each other; for when any one wants food, it bends down its trunk to the Bee from whom it is expected, which opens its honey-bag, and lets some drops fall into its trunk, which at this time is opened wider, on purpose to receive it. Their diligence at labour is so great, that in a day's time they are able to make cells, which lie upon each other, numerous enough to contain three thousand Bees.

These cells are composed in a more exact proportion than those of Wasps; for in these, their bottoms terminate in a point designed to receive the egg, which perhaps could not be so certainly hatched, if it was laid upon a broad bottom. The bottoms of these cells are composed of little triangular panes, which, when united together, terminate in a point, and lie exactly upon the extremities of other panes of the same shape, in the opposite cells. These lodgings are composed of a double row of cells, which touch at the bottom, and are suspended perpendicularly, with a space between each two, large enough to give the

Bees a free passage in and out, and narrow enough to preserve the necessary heat. All the cells are defended by a border, which makes the door a little less than the inside of the shell, which renders their works stronger, and is the more necessary, as Bees will live seven or eight years. Their houses or cells do not become weak by length of time, since each egg first turns to a maggot, and then into a Bee, at which time the outward covering is left behind, and united close to the sides of the shell, insomuch that they become more substantial every year. They have cells that serve for several purposes, namely, to lay their young in, for their wax, and for their honey.

These cells are of so regular a form, and applied so ingeniously one against another, that every thing seems to be disposed, with such symmetry, and so well finished, as to exceed even the efforts of human industry. All the cells are hexagons, that is, they have six equal sides; and this figure, not only takes up the least room, but is the most capacious.

It is no easy matter to see them at work, except by the assistance of a glass hive. They are always ready to assist each other, in laying the foundation of some new comb, or in enlarging the old, though a spectator might conclude, from the hurry that they are in, that there was nothing but confusion among them. However, it is easy to perceive, that their teeth are the instruments, by which they model and fashion their combs. They begin at the bottom of their building, and several of them work at a time at the cells, which have two faces. But if they are stinted with regard to time, they give the new cells but half the depth which they ought to have, leaving them imperfect, and put off finishing them till they have sketched out the number of the cells, which are necessary for the present time. The construction of their combs costs them a great deal of labour, for they are not able to make them in molds, as at first some might think they were. They are all busied in erecting, shaping, and polishing the cells that are unfinished; and the use they make of them, is to lodge their honey, and to deposit their brood therein; for there
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the eggs increase and grow, till they are transformed into Bees. But the cells designed for the worms to change into drones, ought to be larger than the rest; and for that reason, they make some with greater diameters than others. The cells of the brood, at different times, serve for the honey-combs; however, those that were designed for the honey only are much deeper than the rest. When the harvest of honey is so plentiful, that they have not sufficient room for it, they either lengthen their combs, or build more, which are much longer than the former.

Sometimes they work at three combs at a time; for when there are three workhouses, more Bees may be employed at a time, without embarrassing each other, and they can perform their business more readily. The combs are generally parallel to each other, and are slightly fastened to the top of the hive. There is always a space between two combs, which are like streets, that will only admit two at a time, a-breast. Though the combs consist of very thin leaves of wax, yet when they are full of honey, they become heavy. The Bees have a method of connecting their combs to the sides of their hive; for which reason, those that make them should place small sticks across each other, to serve as supports to the combs that are to be built, which will save the Bees a great deal of labour.

The substance wherewith they make their combs is gathered from flowers, but not from every sort indifferently; for it is only on the stamina of flowers, that yield proper materials for making their wax; for they find none ready made. It is very common to see Bees sitting upon flowers, with their bodies all over powder, which they could have got no where else. Sometimes they are so full of it, that they become quite yellow, and might be mistaken for another insect. However, they take care to clean themselves with the brushes of their feet, and to make the powder into two small balls, which they place in the two triangular cavities of their hinder legs. Sometimes these balls are as large as a grain of pepper, a little flatted.

When the flowers are not fully blown, the Bees pinch the tops of the stamina with their teeth, wherein they

know the grains of dust are enclosed; and by this means they force them open. Some of these balls are yellow, others red, others of a whitish yellow, and others again green. This substance, however, does not, as is generally supposed, become wax, till it has been eaten and digested by the Bee. In *April* and *May* the Bees are busy from morning to evening, in gathering this substance for making the wax; but when the weather becomes hot, in *June* and *July*, they work only in a morning, till about ten o'clock; because when the powder of the stamina has been moistened with the dew, or with the fluid that they transpire, it is of a more proper consistence, than at other times, to be moulded into a mass.

It is said that the second stomach is the organ, by which this powder is altered, digested, and connected into real wax, and is thrown out through the same passage that it went in. It is with this sort of paste that they build their combs, and when it is dry, it becomes the substance, named Bees-wax. Every comb newly made is white; but they become yellowish as they grow old, and the very oldest of all become almost black. But all these do not furnish wax equally white, as is well known to those, whose business it is to blanch it.

However, as it is necessary for Bees to make a provision of rough wax, there is in every hive a pretty large portion of the combs, whose cells are filled with nothing but wax; and these are like so many little magazines, where the Bees go to deposit their little balls, one after another, while other Bees take care to knead them, press them, and place them in order. These provisions of undigested wax, which some have called Bee-bread, serve them in winter, as feeding upon honey alone would give the animal a scowering, that would quickly carry it off. The Bees sometimes come out of their hives at 4 o'clock in the morning, and continue labouring till 8 in the evening. They fly backwards and forwards, four or five times in a day, and sometimes more, for this depends on the length of their journies, and the plenty of flowers.

It is observable, that the Bees extract but a small quantity of real wax out of the powder which they gather; because a great part of the materials of wax serves to feed them; it is also remarkable, that the drones never employ themselves in making wax, all their nourishment being honey. With regard to the honey, it is but lately taken notice of, that there are vessels in flowers full of a sweet fluid, to which authors have given the name of nectarium, and it is to these that the Bees resort, to gather the liquor, which afterwards becomes honey. For this purpose, they make use of their trunks, and with these the Bees conduct the fluid to their mouths, causing it to run along the upper part of their trunks. The powder of the stamina produces the nourishment of Bees; and it is very well known, they do not make honey on purpose for us. The sweet fluid falls from the oesophagus, or gullet, into the first stomach, which while it is filled with honey, is in shape like an oblong bladder. Children that live in country places are well acquainted with this bladder; and they even seek for it in the bodies of the Bees, and more especially in those of humble Bees, to suck out the honey. When a Bee has sufficiently filled its first stomach, it returns back to the hive, where it throws up the honey into a cell. There is reason to believe, that the honey does not return out of the body unchanged; because the first stomach is capable of contraction, in the same manner as that of ruminating animals. It often happens, that the Bee, instead of flying back to the hive, goes back to the places where the other Bees are busy in their several employments, and offers them honey, perhaps to hinder them from leaving off their work, to go in search of food. Some of the honeycombs are always left open for common use, but many others are stopped up, till there is a necessity of opening them; each of these are covered carefully with wax, so close, that the covers seem to be made at the same time. This practice tends to preserve the honey in the same degree of fluidity, as they design it should have.

In the management of BEES, great care must be taken to provide them a proper lodging. The hives

designed for this purpose are of different forms, and different materials, in different countries ; but they are generally a sort of baskets, nearly of a conical figure. Those that are most skilful in the management of these insects, affirm, that the hives ought to be made of platted rye straw, because they are most proper to defend the Bees against the severity of the winter cold, and the scorching heat of summer. Some plaster them over with a mortar, or with ashes, mixed with cow dung ; by which means no rain can get into the hive ; for all the crannies will be stopped up, by which it might enter.

The hives ought always to be placed where the sun may shine upon them the greatest part of the day, and consequently they should never be exposed to the north wind. Likewise, they will be best to be so placed, that the sun may shine upon them early in the morning, as also late in the evening. However, it must be observed, that though the sun is very advantageous to Bees, yet there are times, when his beams are too scorching, which will render the hives too hot, so as to disturb the Bees, and to melt their wax. Upon this account, it will be best to place them under a cover or roof, to preserve them from the extreme heat of the sun, and from the rain. But where this cannot easily be done, they may be thatched or covered with straw, which will have the same effect.

Glass hives are a new invention, and were designed to enable persons to see what was doing in the inside. However, they are needless in the winter season, because when there is a frost, the Bees are so benumbed, that any one may examine their hives, by laying them on one side, or even turning them upside down. Then the Bees may be seen heaped together, and lying as close to each other as possible. They generally keep in the lower part of the cakes of wax, or at most about the middle of the hive. But as soon as it thaws, and especially if the sun shine, so as to render the hive warm, they then are roused out of their lethargy. Hence it appears, that heat is absolutely necessary for their preservation ; and this they endeavour to increase, by their motion, and the agitation of their wings.

Like-

Likewise, the more numerous the Bees are in a hive, the warmer they are. However, when their activity is returned, they are then under a necessity of taking nourishment, and consequently have recourse to their provisions; for then they begin to feed upon the lower combs. Hence the milder the winter is, the more honey they consume; and they are sometimes in danger of a famine, and of dying of hunger, before the flowery season returns. Thus a very severe winter and one that is too mild, are equally dangerous.

It is commonly said, that the ashes of a fig tree is capable of bringing dead Bees to life; but this is a mistake: for those Bees, which are thought to be dead, because they are motionless, are not really so; though it must be owned, that in extreme cold weather, any person may be deceived. At this time, a handful may be taken, without the danger of being stung; but if they are put upon warm ashes, or near a gentle fire, they will immediately show that they are alive.

Besides cold, hunger, and old age, Bees are said to be subject to fluxes, which sometimes bring on a mortality among them. They are also subject to other diseases; and those Bees that are brought into any close place, such as a green-house, during the winter, are more subject to diseases, than others that are left in the gardens, with an aperture, by which fresh air may enter, and through which they are at liberty to fly out when they please, and when the weather is fine. However, the middle practice is the best, which is, to leave those hives in the open air, that are well stocked with Bees, and to place those in the green-house, which are thin of them. It is the opinion of *Reaumur*, that it will be the best to put these last into tubs, open at the top, and to fill up the empty spaces, between the sides of the tub and the hive, with fine hay, short straw, sand, or dried earth; but they must be defended from the rain, by a covering, placed at a proper distance over it. This he thinks is a good expedient to preserve them from the effects of cold, and much better than to place them in a green-house. The charge will be little, because the same tubs will serve for a great num-

ber of years. Large wicker baskets may be also made use of in the same manner.

The design of the stings of Bees is not to hurt mankind, but to defend them against their enemies, which are very numerous. Hornets and Wasps will tear open the bellies of Bees, to suck the contents. Spiders also are enemies, but they are not able to do so much harm; as for Ants, they want nothing but the honey; but Lizards, Frogs, and Toads, will eat the Bees entirely up, when they can catch them. There is also a sort of Moths, that will get into their cells, and will penetrate into a great number of them, to feed upon the wax, of which they are extremely fond. Old Bees are subject to a kind of Lice, which are not found upon the young; however they do not appear to be greatly molested by them. Field Mice and Birds are greater enemies to Bees, than any thing else; insomuch that in one night, when they are benumbed in the winter season, a single field Mouse is able to destroy a hive that is very well stocked. *Reaumur* observes, that these animals generally eat nothing but the heads and the breasts. They will serve Birds much in the same manner; for the young of Larks have been found near the nests, that had nothing wanting but the head and neck. It is also said, that among Birds, those called Bee-eaters, Swallows, and Titmice, feed greatly upon Bees; but the Bird that does most mischief among them, and destroys more than all the rest put together, is the Sparrow. They swallow them like grains of corn, and have been seen to carry three Bees at a time, to feed their young with, that is, one in their bills, and two others in their claws.

Those that are accustomed to take care of Bees may go among them very safely, provided they do not anger them; but if they do, they must expect the reward of their rashness. They generally attempt to sting people in their faces, and when any one is stung, if the Bee is forced away too soon, it always leaves its sting behind, with its appendages; but then the Bee will live but a short time after it. The sting is generally more painful in summer than in winter; for this depends

depends upon the quantity of the venom, and the vigour of the Bee: besides, there are persons who are more affected with the stings of Bees, than others. Generally speaking, the sting is followed with an itching, an inflammation, a swelling, and a sharp pain; and if it happens to be near the eyes, the eyelids will sometimes close up for several days. Authors that have wrote upon this subject, pretend to give several remedies against the stinging of Bees; but *Reaumur* has tried them all, with little success; however, he thinks that the herb, called arse-smart, has proved better than any thing else, when bruised in a mortar, and applied thereto. But the best way is to take out the sting as soon as possible, and then apply a little water or vinegar to the wound, which will remove the pain; yet it has been observed, that it has sometimes returned again, with as much violence as before.

Some have pretended, that there are certain smells, which give great offence to Bees; and that they are fondest of every thing that is clean and pure; but this is a mistake, for they always like standing dirty water, better than that which is quite limpid. But smoak will cause them to get at a distance from it, and if they cannot readily, it benumbs them, and makes them lie as if they were dead; this is the method some make use of to get part of the honey out of the hive. This operation is performed at different times, in different countries; but the best is in the morning, after the Bees have been rendered less active by the coldness of the night, and then it will be almost needless to smoak them. However, in a warm season, when flowers are plenty, they may be made to pass out of a hive that is full of wax and honey, into another that is quite empty; but then the brood will be lost; that is, the eggs, the nymphs, and the worms ready to be changed into nymphs. When the honey is taken way, it is but reasonable, and even necessary, to leave the Bees about half for their own use.

In some places, when the summer is dry, and in consequence thereof, the fields are less fruitful, then it is very difficult for the Bee to gather a sufficient quantity of wax; but in those countries that are full of mea-

dows, that are well watered, and produce a succession of different flowers; or even if there are woods, which by their shape preserve the moistness and coolness of the air, and by that means cause the vegetation of a great number of plants, in the hottest part of summer, then the Bees will find every thing in plenty, necessary for their use.

It was formerly a custom of the *Egyptians*, to carry the hives up the river *Nile* in boats, that the Bees might enjoy the benefit of the flowers that grew upon the banks; thus they removed them from place to place, that they might always have the benefit of fresh flowers. The nations that live near the banks of the river *Po*, manage their Bees much in the same manner as the ancient *Egyptians*; and the same practice has been recommended in *France*; but whether it has ever been done or not, is uncertain. *Columella* acquaints us, that the *Greeks* were accustomed, every year, to remove the hives from *Achaia* into *Attica*; and the same thing is done at this very day, in the dutchy of *Juliers*, a district of *Westphalia*, in *Germany*. One person in particular, in the territory, called *Gatenois* in *France*, has been at the pains of removing his hives, after the harvest of *Sainfoin*, into the plains of *Beauce*, where the melilot abounds, and then into *Sologne*, where it is well known the Bees may enjoy the advantage of Buck-wheat, till towards the end of *September*, for so long that plant retains its flowers. However, this practice cannot be very agreeable to the Bees, because their being carried in carts disturbs them more, than if they were in boats upon the water.

Authors have given different accounts of the length of the life of Bees; but they have generally maintained, that they may live several years; that is as long as a hive retains plenty of inhabitants; but this is a bad reason. Some affirm, that Bees will live six or seven years, and others upwards of twelve. Others again pretend to be certain, that a third part in every hive dies in autumn, and as many in the spring; for which reason they conclude, that they cannot live above a single year. It is pretty certain, that

that the Bees of each hive are renewed every year, or in two years time at most.

It is generally acknowledged, that the habitation of Bees ought to be very close, and therefore it is their principal care, at first when they are hived, to stop up all the crannies. They make use of a sort of resinous gum, which is more tenacious than wax, and differs greatly from it. This the *French* call propolis. It will grow considerably hard in *June*, though it will always grow soft with heat, and it varies in consistence, colour, and smell. It has generally an aromatic, agreeable smell, when it is warmed, insomuch that some place it in the rank of perfumes. The outward colour is of a reddish brown; but the inward more yellowish, and nearer the colour of wax. When the Bees begin to work with it, it is soft; but it acquires a firmer consistence every day, till at length it becomes harder than wax. The Bees carry it on their hinder legs, and some think it is met with on poplar, birch, and willow trees; but there are others that will supply them with the same. It is much harder for them to get it from hence, than the powder which is upon the stamina of plants, and more difficult to manage: the Bees make use of the same substance to cover the sticks laid crossways, which help to support the combs; and often they plaster a great part of the inner sides of hives therewith.

Some years since Mr. *White*, a clergyman, found out a method for the preservation of Bees, by what he called Bee-boxes; and acknowledged he had been almost forty years in bringing them to perfection. These must be made in the shape of a die, and each board of which they consist must measure about eight inches and a half on the inside. The boards must be strong and dry, and at the bottom must be an opening, four inches long, and only half an inch high, that is so low as to exclude a mouse. In the upper part behind must be fixed a piece of crown glass, five inches long, and three broad, which must be covered with a shutter, to be opened at pleasure. At the two ends of the box a space is to be left, near an inch wide at the top, and more than an inch wide at the bottom; the two ends

are made by pieces of flit deal, shooting into the edges of the front and back boards. The boxes have no bottom-board, but there must be a stick across them, from end to end, about three inches from the bottom, to support the combs. There must also be a board to cover the end, which, as it is to be moveable, must be tied on with tape, fastened by pegs fixed in the box, and turned round at pleasure.

When the Bees are to be hived, two boxes must be tied together, the ends having the passages of communication left open where they join, being covered with end-boards at the two outer ends. When the Bees are entered, the box must be covered with a linen cloth, and green branches; but the placing of the boxes is of much less importance than is generally thought, because they will thrive even on the north side of a high tower; for if the shutter of the window be kept close, and the sun fenced off, they will not suffer much inconvenience. They bear cold with little injury; but the hot sun in the summer months melts their wax, and in the winter hinders them from sleeping, and makes them consume the stores the sooner. The boxes are to be placed on stages, one above another, with a cover over head, and a board before them, to shelter them from the sun. When the Bees are hived, it will be proper to look through the glass, to see in which of the boxes they are settled; which known, the mouth is to be stopped, that they may pass only through the empty box. When they have filled one, they will begin to work in the second, and then a third must be added, by taking off the end-board, which they will have fastened with wax; and putting the new one close, with an open passage, the mouths of the two end-boxes must be stopped, that they may go in and out only at the middlemost. About the middle of *August* you must uncover the glasses, and peep into the hives. Those Bees that have filled three boxes, may without any danger lose one. About three in the afternoon, therefore, observe the end of the box, in which there are fewest Bees; open the mouth, and divide it from the middlemost, by sliding a plate of tin between them. The communication being thus stopped,

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ped, the Bees in the single box will fly out in about two hours, leaving the box empty, and join their fellows; the end-board must be then laid on the end of the two boxes, and they may be left till next spring.

By the use of these boxes, the time of their swarming may be known; for Bees do not leave their habitations but for want of room, which by this method may be more or less, at pleasure. If they are confined to two boxes, they will swarm early; but if they are allowed three, the swarm will be late and longer. After the first swarm, it will be proper to prevent a second, by adding box after box, as often as they are filled. Such colonies as require four boxes to keep them from swarming, will admit the master to take two of the boxes in the autumn. If Moths should happen to spin their Webs in any box, it must be either taken away, or cleansed. It has been found by experience, that when Bees swarm late, and wanting provisions of their own, they cannot be preserved by giving them honey; because it corrupts, and the crude-wax, called Bee-bread, is necessary to their support. When the two colonies therefore are weak, there is no way to preserve them; for they must either perish, or one must be supplied by the destruction of the other. It has been imagined by some, that Bees may be multiplied without end, and that consequently there are no limits to their products or profits arising therefrom; and yet it is certain, that a few years will produce as great a stock, as any country can maintain; for one place will yield only a certain quantity of honey, tho' one much more than another.

In different countries, the swarms make their fall at different times; and in the same country, they leave the hives sometimes sooner, and sometimes later. There are several signs, which foretel when the Bees are going to swarm; but the most certain is, when the working Bees do not fly into the fields in the accustomed numbers, though the weather seems to invite them. The time is from ten in the morning till three in the afternoon, that the swarms leave the hives. When the sun shines bright, especially upon the hive, it invites the Bees to seek their fortune; for the heat

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has a great influence in this procedure, and renders the number more considerable. In less than a minute, all those that are to compose the swarm, leave the hive, and flutter in the air, like flakes of snow. However, it does not appear that the queen chuses the place where they are to alight; for several of the Bees, which are pleased with a particular branch of a tree, go and settle thereon, and are followed by many others, as well as the queen herself; but she does not join them till there are a great number together. When it comes to be pretty large, then it is soon greatly encreased; insomuch that in about a quarter of an hour they all seem to be at ease. Sometimes, when they leave the hive, they rise so high in the air, that they get out of sight; and to make them come down, the people throw handfuls of sand or dust after them. Some suppose, that the Bees take the grains of sand for drops of rain; but it is the common method to beat brass kettles and pans, as soon as ever they perceive the swarm ready to fly. It is pretended, that the tinkling of these vessels is taken for thunder, and that it obliges the Bees to seek a proper place for a retreat. However, a more probable reason is, that it drowns the hum of the guiding Bee, and the swarm, thus finding themselves incapable of hearing the directions of their leader, are obliged to settle. When the Bees are fixed, they cause them to enter into a hive, rubbed with the leaves of baum, mixed with a little honey. When they make their first sally, there may be several females, insomuch that a swarm has sometimes two queens, and is even divided into two bands. But as it commonly happens, that one of these is more considerable than the other, and Bees being fond of a large company, the smallest band dwindles by little and little, by their going to join the largest. Thus a swarm may have two queens, and sometimes more; but they do not continue long; for the supernumary queens are always killed in the hive, where the swarm settles; and till this cruel execution is performed, the Bees never fly abroad to work. If there should be any female Bees left in the old hive, that did not go out with the swarm, they always undergo

dergo the same fate; that is, those that have been newly transformed. Hence it follows, that there is never more than one queen in the same hive. However it must be observed, that the Bees never sacrifice any of the females, when their hives are full of honey and wax; and it is given as a reason, that there is no danger at that time, in maintaining a plurality of breeders.

BEEES, in some sense, observe the same rules as Wasps; for when the time is come that the males are no longer necessary, the working Bees declare war against them; and in two or three days time they make a dreadful havock amongst them; insomuch, that the ground all round the hive is strewed with dead bodies; nay, they will even kill those that are yet in their worm state, or of that of an Aurelia. This butchery is performed at different times; for in some hives it happens in *June*, and in others not till *July* or *August*.

When the hive sends out several swarms in a year, that which first proceeds therefrom is always the best, and most numerous; and then likewise they are able to lay up the greatest plenty of honey and wax. It is remarkable, that a swarm always consists of Bees of all ages, and likewise there continues in the hive Bees of all ages. The number of them is always more considerable, than that of the inhabitants of many large cities; for sometimes they are upwards of 40,000. It is wonderful to consider the activity of Bees, when they first enter an empty hive; for often, in less than twenty-four hours time, they will make combs above twenty inches long, and seven or eight broad; and sometimes they will half fill their hives with wax in five days; insomuch, that a swarm will make more wax in the first fifteen days, than they do afterwards all the rest of the year. When a swarm is considerable, and appears early, they sometimes send out another the same year.

In consideration of the care and trouble that people are at, in taking care of the preservation and multiplication of Bees, it appears reasonable, that they should partake with them of the fruit of their labour. But it is a kind of barbarity to destroy all the Bees
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with sulphur, or otherwise, to get all the wax or honey; and yet we see this is often done by those, who make a trade of dealing in such commodities. In some countries this practice is forbid, and particularly in *Tuscany*. With proper care, a great number of hives might be saved every year, and there cannot be too many in those places that greatly abound in flowers. It must be acknowledged that honey is not in such great request as formerly, before the making of sugar was found out. However, it is of great use still in many respects; and the consumption of wax is greater than ever. In *France*, a good swarm, in two years, will yield two pounds and a half of wax, and near thirty pounds of honey; and therefore, under a good regulation, a considerable profit may be made of them. But Bees are still more beneficial, in countries that are covered with flowers the greatest part of the year, especially in hot countries, such as *Spain*, *Peru*, and *Mexico*, where tallow is always too soft to make candles with.

In *Muscovy*, and in *America*, there is sometimes found, in the trunks of old trees, a sort of black wax, in round bits, of the size of a nutmeg. This is produced by small Bees, who make their combs in these hollow trunks, whose honey is of a citron colour, and of a very agreeable taste. This wax, when heated, has a smell like baum, but it is seldom to be met with in *France*. The *Americans* make candles with the wax, and likewise small vessels, which they make use of to gather the balsam of Tolu.

With regard to the medicinal qualities of Bees, it is well known, that they are diuretic, when reduced to powder, and the dose is half a dram in a morning, incorporated with the extract of juniper berries; or it may be given in a glass of diuretic wine. The same powder, strowed upon the head, will make the hair grow, and it will become thicker than before.

There are two sorts of honey, that is, the white and the yellow. The white is taken without fire from the honey-combs. These they break soon after they are made, and lay them upon hurdles or mats of osier, or on linen cloth, fastened at the four corners to as many

ny posts, and then an excellent white honey will fall from the combs, and grow hard in a short time. Afterwards they put it into glazed earthen pots; this they call virgin honey. Some press this honey out, but then it is not so agreeable, for it will taste of the wax. The best sort of this honey, that the *French* are acquainted with, is that of *Languedoc*, called honey of *Narbonne*. It should be new, thick, granulated, of a clear transparent white colour, of a soft, and somewhat aromatic smell, and of a sweet and lively taste. If it is very pure, it is almost as hard as sugar candy; and that which renders it different from all others, are the many aromatic flowers that grow in those parts, and from which the Bees gather their honey. It is always observable, that the honey made in mountainous countries, where the sun has great power, is more fine, and more spirituous, than that which is produced in low grounds, not well warmed by the sun.

The honey made in the spring is more highly esteemed than that gathered in the summer; that of the summer, more than that of the autumn, on account of the flowers. Likewise, there is a preference given to young swarms before that of old ones.

Yellow honey is made from all sorts of honeycombs, that is, old as well as new; and even of those from whence the virgin-honey has been extracted. They break the combs, and heat them with a little water in basons, or pots, keeping them continually stirring; then they put them into bags of thin linen-cloth, and these they put in a press, to squeeze out the honey. The wax stays behind in the bag, though there is always a little of it passes through with the honey; for when it is distilled, there is constantly found small bits of wax that rise with the spirit.

Yellow wax should always be of a good consistence, of a fine yellow, and well tasted; the *French* take that to be the best, that is made in *Champagne*, because the soil is dry, and the flowers aromack. It contains a great deal of essential or acid salt and phlegm, and a little oil and earth. The white honey contains the same principles, but not quite so much salt.

The ancients, as has been already taken notice of, made greater use of honey, than we do at present, because sugar was not then so common; but in some cases it is still preferred; for it is more purging in glysters, and cleanses wounds better, upon which account it is mixed with digestives. It is a greater preservative of the compositions into which it enters than sugar, on account of its clamminess; and for this reason, it is made use of in Venice treacle, and mithridate. It also deserves to be preferred, because it contains the most essential substance of flowers, and may be said to contain the quintessence of aromatic plants. Honey taken in substance, is pectoral, laxative, and deterfive, and is good in many disorders of the lungs, occasioned by a gross phlegm. It also loosens the belly, and is made use of in clysters. The whitest honey is best for inward use, as the yellow is for outward. Some use it as an aliment, and then it is easy of digestion, and supplies the blood with a new balsam of life; however, it is not good for dry bilious constitutions. We are told in the *German Ephemerides*, that a young country girl, having eaten a great deal of honey, became so inebriated with it, that she slept a whole day, and talked a little idly the day following.

The most common preparations of honey for drink, are mead, and metheglin; these in some countries are in high esteem. The common hydromel is made with boiling an ounce and a half of honey, with a quart of spring water, taking off the scum; after which it is strained through a cloth, and may be used as common drink. This is good against coughs in old people, and when any person cannot bring up phlegm without difficulty. Some direct it against internal ulcers, because they suppose it is an enemy to putrefaction.

Vinous hydromel is made by mixing four pounds of virgin honey, with ten quarts of spring water, and boiling it till about a third is consumed, or till an egg will swim thereon. Then it is to be poured into a cask, which must be exposed to the heat of the sun, or in a stove for forty days; or till the liquor will ferment

ferment no longer, shaking it from time to time. Then the cask must be stopped up, and put in a cellar, to be kept for use. This strengthens the stomach, and is very well tasted.

There are kept in the shops other preparations of honey, namely, simple oxymel, and oxymel of squills. The first is made by mixing two parts of good honey, with one of white wine vinegar, and boiling it to the consistence of a syrup. The dose is half a spoonful, and it is thought to be good to incide thick viscous humours, that adhere to the bronchia of the lungs, in a moist asthma. Oxymel of squills has the same virtues, but much stronger.

Honey-water, made by the chemists, has an agreeable smell, and a sharpish taste; and is looked upon as cordial, pectoral, and aperitive. Some wash their heads with it, to make their hair grow, or apply it every day with a sponge. Spirit of honey is opening, and the oil is good against rotten bones.

Externally, wine mixed with honey, is very good to cleanse ulcers, and assist in forming a cicatrice. Honey-water is good to clear the sight, and take off the spots of the cornea. Some make use of the marc of Bees, which is nothing else than what remains after the wax of the combs is pressed out, to cure the pleurisy. For this purpose, they mix it with vinegar, and lay it between two clean linen cloths; after which they apply it as a poultice to the pained part, and sprinkle it with vinegar from time to time, without taking it off. It is also good in cold and oedematous swellings, which are hard to be resolved. Farriers also make use of it against bruises in horses.

Bees-wax is composed of two parts, namely, a great deal of phlegm, which keeps an acid dissolved, and an oil. It should be new, hard, compact, a little glutinous to the touch, of a fine yellow colour, and of a pleasant smell, somewhat like that of honey; or rather of no taste at all. Virgin wax is that which is made without the help of fire, and is nothing but a preparation of the yellow; which must be melted, washed several times in water, divided
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into pieces, and layed upon linen cloths, which must be exposed for six weeks or two months to the sun, till it becomes white. Some make use of tartar, and crystals of tartar, by which means they render it of a very fine white. When it is very white, clear, transparent, hard, brittle, tasteless, and will not stick to the teeth when chewed, it is best; for it is then emollient, and opening, as well as the yellow; but it is not so resolute, because the greatest part of the salts are washed away. Bees-wax, in substance, is seldom given inwardly, though it has been used to cure bloody fluxes, particularly in that famous medicine of the cerated glass of antimony. It is sometimes prepared, by putting it into a hollow sweet apple, which must be roasted under hot cinders, in such a manner, that the wax must melt, and enter into the substance of the apple. There must be about two drams of wax, and the whole must be given, thus roasted, in the aforesaid disorder, and the pain will vanish immediately. The butter of wax, gained by distillation, is good to resolve cold tumours, and for pains in the joints; as also for the palsy, as well as for parts that are frozen, and for chaps in the breast, when used as a liniment, and applied to the part affected. Four drops of the oil of wax, which is nothing but the butter rectified, given in a proper water, is very diuretick, and is good in the nephritic cholic. Some give ten drops for this purpose.

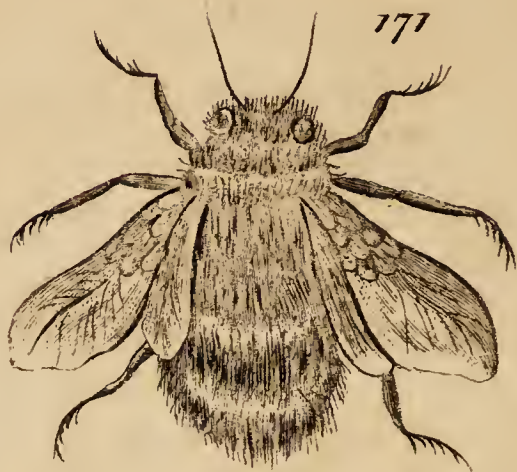
The Propolis, taken notice of above, is an attenuant and resolvent, and good to ripen boils, as well as for malignant ulcers. It is mixed in *France*, in plasters and in ointments, and if the vapour of it is received into the mouth, by means of a funnel, it is said to be very good to mitigate inveterate coughs. The method is, to throw bits into a chafing-dish that has fire in it.

There are several kinds of wax, and of different colours, which are occasioned by the ingredients that are added thereto. Thus green wax is composed of white wax, softened with a little turpentine, and coloured with verdigrease in fine powder. This is good for corns in the feet, being applied thereto in the form
of

Mill-Beetle.



Humble Bee.



Mill Beetle without Wings.

Three Cicindela.



The Reverse.



of a plaster. Red wax is made in the same manner, with the addition of vermillion; it is resolvent, when applied outwardly.

The HUMBLE BEE is the largest of all the Bees, being near three quarters of an inch long, and a third of an inch broad; the body is black and hairy, only the back part about the vent is white, and the fore part is a little yellow. This sort build their nest in holes of the ground, or in moss, of dry leaves, mixed with wax, and it is pierced on all sides like a sponge. Each humble Bee makes with wax a little cell, about the size of a large pea, and when it is cut through the middle, it appears to be round and hollow, like an egg-shell. They join several of these shells together, in such a manner, that they appear like a bunch of grapes. The females, which have the appearance of Wasps, are very few, and they lay their eggs in the open shells, after which the rest cover them, or stop them up with wax. It is uncertain whether they have a queen or not; but there is one much larger than the rest, without wings, and without hair, and all over black, like polished ebony. This goes and views all the works from time to time, and enters into the cells, as if it wanted to see whether every thing were done right. In the morning, the young Humble Bees are very idle, and seem not at all inclined to go to work, till one of the largest, about seven in the morning, thrusts half of his body out of a hole designed for that purpose, and seated on the top of the nest, where it beats its wings for a quarter of an hour together, and makes a great noise, till all the rest are put in motion. The Humble Bees gather honey as well as the common Bees, but it is not so fine, nor so good; for their combs, they make use of the shells from whence the young Humble Bees proceeded, and they close the open parts with wax. One part of these Bees continue flying constantly about the nests, in the same manner as the drones of the common Bee, and are probably the males of this kind; but however this is not very certain.

The *green and yellow* BEE is the most beautiful of this kind, and is of the shape of the common Bee, but

but smaller. The head and breast are of a bright fine blue, with a small mixture of green; the body is of a fine glossy yellow, and seems to be gilded; the breast, and the last segment but one of the body, are dentated behind, and the feelers are black, and consist of twelve joints.

The WOOD BEES are larger than the females of the common Bee, and their bodies are of a blueish-black, smooth and shining. Their fore wings are of a deep violet-colour, and their bodies are flatter than those of drones; on the sides, the hinder part of their bodies, and on the breast, there are long black hairs. Their trunks are like those of the common Bee.

These BEES are not common, and yet there is scarce a garden but some of them may be seen in different seasons of the year; they first appear when the winter is over, and they fly near the walls, exposed to the sun when it shines. They make their nests in some piece of wood fit for their use, and then they begin to hollow it; but it must be observed, that they never do it in trees that are standing, and the reason is plain, for the wood they make choice of is half rotten. The holes are not made directly forward, but turning to one side; they are as large at the entrance, as to admit a man's middle finger, and are sometimes twelve or fifteen inches long. On the inside there are three or four of these long holes; the instruments they make use of are their teeth, and it is here that they lay their eggs. The cavity is divided into about twelve cells, which have no communication with each other, and in each of these they lay an egg, about which they put a sort of paste for their nourishment.

When they turn to Worms, they are very white, and are like those of common Bees; the nymphs that proceed therefrom are also at first white, and afterwards grow brown, and then blackish by degrees. The females only perform all the work, and the males have no sting. The paste is made of the meal they gather from the stamina of flowers. These Bees feed upon a sort of Lice, of a reddish-brown colour, and no bigger than the head of a small pea.

MASON-BEES make their cells with a sort of mortar, made of earth, which they build against a wall that is exposed to the sun. The mortar they make them with becomes as hard as stone, which perhaps may be one reason why they prefer stone walls to any other. These are made to lay their eggs in, and these undergo the same metamorphosis as those of common Bees; but each nest or lodging consists of several cells, each to contain a single egg. Some of these Bees are red, others black, but they are all nearly of the same size, being as long as drones, but not so thick.

The *black* MASON-BEES are armed with a sting, but the red have none, and these are the males, which never perform any work. The liquid, that makes the mortar, proceeds from their mouths, and serves to glew one particle of earth to another; on the outside their nests are rough, but within extremely smooth, and each cell is about an inch high, and near half an inch in diameter, and to these she brings the food that is necessary for the young; which is a sort of paste, like that of the Wood-Bees. There are about seven or eight cells in each nest, generally speaking; for sometimes there are but three or four, and they are placed one over another. If the nests remain unhurt, or want but little repairs, they make use of them the next year, and sometimes they will serve two or three times successively. They begin to build in the middle of *April*, and some have not done till the end of *June*. Tho' their houses are so strong, they are not quite safe; for they have several enemies, particularly a Worm, with strong teeth, with which they make holes in the nest, and devour the brood.

There are other BEES of this kind, that do not make their houses so strong, the reason of which is, they are always sheltered in places that will keep out the rain. They make choice of stones, with holes therein, that are not too large, and whose entrance will just allow them a passage thereinto; but if it should chance to be too large, they stop up part of it with mortar, and make the hole exactly round.

These are all over downy, and of two colours; for the down on the body is a kind of orange, and that
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on the breast-plate black, the trunk is small, and made like that of common Bees ; but the teeth resemble the blades of scissors, only they are ferrated. They have two horns or feelers, placed on the fore part of their heads, but they are not flexible. Their paste is more liquid than that of the former, and they always stop up the holes of the cell with the same sort of earth wherewith their nests are built.

There are several BEES that build their nests in the earth, wherein they make cylindrick holes, five or six inches deep, and sometimes near a foot ; but the mouths of them are narrow, that is just big enough to admit the Bee. It is wonderful to behold how patiently they work, for they carry the earth always grain by grain, laying them on the sides, and making therewith a little hillock. Sometimes the walks of a garden have been found full of these holes, from one end to the other. Some of these Bees make them directly downward, and others almost horizontally ; and others again in fat sand, but near the bottom they are always more smooth and even than elsewhere ; they lay up provisions for their young, like the former sorts, but it is of a different nature, for it has the appearance of corn, and has a sweetish taste.

Some of these BEES are not so big as small House-Flies, and others are as large as common BEES. Some are of a longish shape, and others short : those that make their nests in the allies of gardens are small, but have the appearance of common Bees. Among those that make their nest in sand, there are some black, with wings of a deep violet-colour, and have a little whitish down or hair on the inside of their thighs. There are other Bees as large as the former, that are entirely black, except at the sides, on which there is a row of white tufts.

The BEE FLY is a sort of species by itself, it being of a nature between a Bee and a common Fly, and it feeds its brood with a sort of a sweet paste. The trunk differs from that of the common Bee ; for its greatest part is hid in a sort of shelly sheath, and when it is thrust out of it, it is accompanied with a sort of threads, four in number ; but, when it is not used,

it

it lies under the teeth. Under these there is a sort of a fleshy feat, which is the real tongue of this Fly, with which it licks the trunk. The body is longer than that of any other Bee, and the rings that compose the trunk nearest the breast-plate are reddish on the upper part. They make their nests in the earth, nine or ten inches deep; and the females of these Flies are armed with a sting; but the males, which are larger, have none.

The *Leaf-cutting* BEES make their nests and lay their eggs among bits of leaves, very artificially placed in holes of the earth, sometimes in the fields, and sometimes in gardens, which are of the length of a tooth-pick case. They make the bits of leaves of a roundish form, and line the inside of their nests therewith, which they afterwards line with paste of a reddish colour; it is of a sweetish taste, but somewhat inclinable to the acid. All these Bees are short, and they are of several species. Those that build their nests with chestnut-leaves, are as big as drones, but those that make use of Rose-tree leaves, are smaller than the common Bees, and have not down enough on their bodies to hide their shining. The upper part of their bodies is of a brownish-black, but on each side there is a border of hair, almost white, made by a row of tufts. The end of the body is of a blackish-brown, as well above as below; but the three rings next to it are covered, on the belly part, with long hairs of a cinnamon-colour, and those of the corslet are brown; there are likewise some that are yellow on the fore part of the head. That of the chestnut-tree is red above, but underneath of a whitish-grey.

There are one or two more species of these Bees, and all their trunks are made like those of the common Bees, only they are covered above, and on the sides, by a strong shelly case. These serve to prevent the rubbing of the trunks by the edges of the pieces of leaves, when they are cutting them off. The males are less than the females, and are more pointed behind; and when they are pressed by the fingers, there proceed therefrom six small horns, three on each side. Each of the teeth is terminated by a hook, sharp at

the end, and they are ferrated on the sides. When this Bee has finished her nest, she fills it with paste, lays an egg, and then closes it up. When the egg is grown to a proper size, it weaves a silken shell, which sticks to the sides of the leaves in the shell. The outside of the silk is coarse, and as brown as coffee; but the inside is very fine and white, being smooth and shining like satin.

The WALL BEES are so called, because they make their nests in walls, of a kind of silky membrane, with which they fill up the vacuities between the small stones found in walls. They consist of several cells, placed end to end, in the shape of womens thimbles. Though the webs of these membranes are very close, yet they are transparent, and of a whitish colour. It is thought they spin these webs with a gluey substance, out of their bodies, much in the same manner as a Silk-worm. They are less than common Bees, but, like them, have a corset of red hair, and the rings of their bodies are brown, bordered with white hair. They are in shape like the leaf-cutting Bee, and the trunk is different from that of the common Bee, it being more short and thick, larger at the end than elsewhere, and a little cloven. There are transverse rays or streaks, that are formed by short hair on the upper part, and longish hair borders the turn of the hollow part. The males and females are all of the same size; but the former are without a sting. The feet of these Bees are very proper to dig the earth; for they have two points, one at the end, and another that is more short, insomuch that they make a sort of fork with unequal prongs.

The TAPESTRY BEES are so called, from lining their nests with a sort of tapestry, which they get from the flowers of the wild poppy, newly blown, placing bits thereof at very small distances from each other. The places, where they chuse to build their nests in the earth, are by the sides of highways, and the paths in corn fields. It is more hairy than the common Bee, but much of the same colour, only shorter in proportion; when their nest is finished, it fills it with paste, like some of the former.

There

There are several sorts of foreign BEES, particularly those of *Gaudaloupe*, which are less by one half than the *European*, and are more black and round. They have no sting, and they make their hives in hollow trees, where, if the hole that they meet with is too large, they make themselves a sort of a waxen house, in the shape of a pear, in which they lodge, place their honey, and lay their eggs. Their wax is black, or at least of a deep violet-colour. They lay up their honey in waxen vessels, of the size of a pigeon's egg, and in the shape of the air bladders of carps; and these are so joined together, that there is no space left between them. The honey is always fluid, of the consistence of oil olive, and of the colour of amber. The wax is always too soft for candles, and therefore the inhabitants make use of it instead of corks, to stop up their bottles; it is very good to soften corns on the feet, and warts on the hands, and when it has been applied for some time, the corns may be drawn out.

In *Ethiopia*, there are little black BEES that make excellent honey, and have no sting. In the *Canary Islands* there are swarms of Bees on the mountains, which produce large quantities of honey, but they are of different kinds. The Bees of *Guiney* make excellent wax, and delicious honey. In *Congo* and *Angola* there are two sorts of Bees, one of which make their nest in the middle of woods, and the other on the roofs of houses. Authors and travellers take notice of several sorts of Bees; but, as they are not particularly described, nothing more needs to be said about them.

The HORNET is twice as big as a common WASP, though it is much of the same shape, and has four wings; but those above are twice as large as those below. They are fixed to shoulders of a dark brown and reddish chestnut colour, and with which they fly very swiftly. They have six feet or legs, of the same colour with the breast and shoulders, and an oblong and saffron-coloured head. The eyes are prominent, and in the shape of a half-moon, between which there are two feelers not unlike sickles. The belly, or back part of the body, is joined to the shoulders by a sort

of thread, and the middle of its fore part is of a dark brown colour, and marked with a saffron-coloured belt; the hinder part is all of a saffron-colour; only it is variegated with eight brown specks or spots, as also with a small triangle, and on the joints of the body on each side, by which joints it can contract or extend itself at pleasure. Near the belly there are four black spots on each side, and the tail is armed with a long, robust, venomous sting. It makes a greater noise in flying than a Wasp, and is a dangerous insect. It is pretended, that nine of them are sufficient to kill a man or a horse; but this seems to be doubtful. They begin to appear at the rising of the dog-star, and when that rages are most malignant. However, the best way is to avoid them as much as possible; for they only grow more angry and fierce when disturbed or pursued. They are said to have a leader like the Bees, there being generally several of them together, and they commonly have a retreat in the holes of poor land, where they have a sort of a hive. They do not live above two years, and lie hid all the winter, like other insects, sometimes in the trunks of hollow trees, and sometimes at the roots, where they make their nests, and build cells, whose mouths always turn downward, by which means they are preserved in some sense from rain. The cells have all six angles, and on the outside they seem to be composed of films, like those of birch-bark. They hunt other flying insects, and, as some say, very small birds, which they sting in the head, and so kill them, then take off their heads, carrying the bodies to their nests, and feed upon them. However, many of them die in the winter, because they do not lay up a stock of food like other insects of this kind.

There is a sort of HORNET in the *East-Indies* that has a claw, like a pincher or nipper of a crab, with which they pinch so hard, that they will not let go their hold, unless their heads are cut off. Besides these, there are several others, which differ in bigness and shape, some being above five inches long, and of a dark brown colour. They have two pair of wings, and the uppermost is harder than the lowermost. They
feed

feed upon herbs, and the fruits of trees, but not all alike indifferently, for they choose those that are agreeable to their taste.

The *common* WASP is remarkable for making a curious nest, in the cells of which the females lay their eggs, that is one in each, that adheres to it with a sort of gummy matter, to prevent its falling out. From this egg a sort of maggot proceeds, which the old ones take great care of, feeding them from time to time, till it becomes large, and entirely filling up the shell. The mother, after having received and pulled the nourishment in pieces, which has been brought to her by the working Wasps, goes from cell to cell, to feed each maggot with her mouth. When they come to a certain size, they leave off eating, and begin to spin a sort of a very fine silk, and fix the first end to the entrance of the cell, then turning their heads, first on one side, and then the other, they fix the thread to different parts, and thus they make a sort of stuff, which serves as a partition to the door. After which they divest themselves of their skins, and the maggot dries up, letting its case fall to the bottom, and there remains a white nymph, which, by little and little, thrusts out its legs and wings, and insensibly acquires the colour and shape of a Wasp. First it will thrust out one horn or feeler, and then the second; to which a leg succeeds, and the head begins to shew itself, till at length the whole body, perfectly formed, comes out.

The WASP thus formed is a flying insect, with an oblong body, consisting of six rings, four membranaceous wings, and six feet or legs, of a golden yellow colour, with black spots, placed in a triangular form. Wasps do not lay up any provision for the winter, like the Bees, and therefore the males and females, that before had the greatest tenderness for their brood, now kill them all, and throw them out of the nest. After this they sometimes take the air, when the sun shines; however, they begin to languish, and endeavour to avoid the cold as well as they can, dispersing themselves about to find out a lodging; those that remain in the nest, are generally all destroyed with the cold, except two or three females. It hardly need to be

mentioned, that Wasps have stings, for most know it by experience, one time or other.

WASPS are of three sorts, namely, the females, which are large, and at the beginning of the year very few in number; the males, which are somewhat less, but more numerous; and the working Wasps, which are supposed to be neither males nor females. These are by much the least, but they make up by much the greatest part of the whole community, which sometimes consists of eight or nine thousand Wasps, that belong to one nest.

About the middle of summer they seek out a hole that has been begun by some other animal, such as a Field mouse or a Mole, to build their nests in; though they sometimes make them in the sides of banks, probably to avoid the rain or water that might annoy them. When they have chosen a proper place, they go to work with wonderful assiduity; for to make their holes, they are at the pains of taking up the earth, and carrying it to some distance. They will, in a few days time, make a cavity under ground, a foot and a half high, and as much broad. While some are working in this manner, others are roving the fields, to seek out materials for their building. To prevent the earth from falling down upon them, they make a sort of a roof with a gluey substance, to which they begin to fix the rudiments of their building, working from the top downwards, as if they were hanging a bell, which however at length they close up at the bottom. They are enabled to labour with the trunk that hangs from their mouths, and on each side there are a sort of small saws, which play to the right and left, against each other; besides these, they have two large horns or feelers, and six legs. They cut the earth into small parcels with their saws, and carry it out with their legs or paws. The materials, with which they build their nests, are bits of wood and glue. The wood they get where they can, from the rails and posts which they meet with in the fields, and elsewhere; these they saw, and divide into a multitude of small fibres, of which they take up little bundles
in.

in their claws, letting fall upon them a few drops of gluey matter, by the help of which they knead it as it were into a sort of paste. When they return to their nest, they lay the bundle upon that part of their building, which they would make longer or thicker. They tread it about with their trunks and their paws, and go backwards as they work ; this they repeat three or four times, till at length it becomes a small leaf, of a grey colour, much finer than any paper. This done, the same Wasp returns to the fields to collect a second bundle, repeating the same several times, making as many leaves therewith, which it lays one upon another. Other working Wasps come and make other leaves in their turns, laying them upon the former, till at length they finish the large roof, which is to secure them from the tumbling in of the earth.

However, they do not do all this in the dark, for they make a hole in the ground, besides the entrance, to see what they are about ; and they leave spaces between the rows of the cells, which are divided from each other into a sort of stories, supported by several rows of pillars. The first is supported by the second, the second by the third, and so on. The cells are made all equal to each other, and quite close, being all level in the same story ; and they are covered by a sort of a flat roof, made of a thick gum or glue, and are as smooth as the pavement of a room, laid with squares of marble. The Wasps can freely walk upon these stories, between the pillars, to do every thing that necessity requires. The pillars are very hard and compact, and they are larger at each end than in the middle, not much unlike the columns of a building. They always go into the lodgings one way, and come out another, by which means they do not hinder each other in their work. All the doors, if they may be so called, open below.

They have two sorts of cells, namely, the large and the small ; the large ones are designed to lay their eggs in, that is such as produce the males and the females ; and the small are intended for the eggs of the working Wasp. There are about forty pillars between every two stages, and sometimes more ; every cell has six

sides, which are so joined together, that there is not the least space or room between them, They are always fond of making their nests in the neighbourhood of Bees, which is done with an intention to rob the hives of the latter, at least when they are too strong for the Bees, with whom they have often fierce battles. When there is no honey to be had, they seek for the best sort of fruits, and are never mistaken in their choice; however, they are fondest of sweet things, for which reason they are often seen in grocers shops; sometimes in cities, as well as country towns. They sometimes feed upon flesh, and will carry bits away half as big as themselves, which they take to their nests for the nourishment of their brood. Sometimes butchers, that cannot easily drive them away, will lay for them a piece of ox's liver, which they love better than any other flesh, because it is without fibres. However, they receive some advantage from it, for while the Wasps are about their stalls, no other Fly of any kind dares to come near them; for the Wasps would hunt them, and give them no quarter. They are great enemies to all sorts of Flies, and sometimes kill the Bees themselves, and afterwards eat them, being not contented with stealing their honey.

The WASPS of the islands of the *West-Indies* are as thick as Bees, but twice as long; they are of a grey colour, striped with yellow, and are armed with a very dangerous sting. They make their cells in the manner of a honey-comb, in which the Wasps are hatched and bred. They generally hang them by threads, composed of the same matter as the cells, to the branches of trees, and to the eaves of houses, which are very low in those parts. In some of those islands they are so very numerous, that the length of two feet of the eaves hardly appears without the cells of the Wasps. There are such numbers of them all along the sides of the rivers, that a man who walks near them ought to take a great deal of care to avoid them; for, if he does not, the Wasps will be sure to fall upon him, and sting him unmercifully. The sting, as in Bees, is accompanied with a venomous fluid, and causes such extreme pain, that some who
have



have felt it, say they should rather chuse to be stung by a Scorpion. It also occasions a swelling that will last three or four days; and, if a person happens to be stung with one in the face, it so disfigures it, that his acquaintance will hardly know him.

In the island of *Granada* the nests of the Wasps are of a very singular structure; for they hang to the branches of trees like fruit, particularly pears, as large as a man's head. They are small on the upper part, and thick on the lower. The inside is divided into three round stories full of cells, like those of honey-combs.

Linnaeus has fourteen insects, to which he gives the general name of Wasps.

1. The HORNET, which has already been particularly described. As also,

2. The common WASP.

3. The black WASP, with five yellow streaks on the belly, is very common; the feelers are black, and in the form of a club, with the last joint below yellow. There are two yellow spots on the sides of the base of the jaws, and two others at the point of the upper lip, two in the forehead, one between the horns, two on the middle of the back, and one on each wing; the base of the breast is marked with a yellow line, and all the legs and segments of the belly are of the same colour.

4. The black WASP, with the base of the breast yellowish, and the belly marked with four yellow streaks, has its feelers almost like clubs, and from the back to the base of the breast there are two spots, in the shape of a triangle. The belly is surrounded with four yellow streaks, and the legs are also yellow.

5. The black WASP, with the point of the breast and the base yellowish, and the belly marked with four yellow streaks, is less than the common Wasp, and the body and feelers are black; from the back to the edge of the breast before is a small yellow line, and on the middle of the breast there is a yellow speck. The feet are black, and the thighs red.

6. The black WASP, with four yellow streaks on the belly, has a black body and yellow legs; the belly is

surrounded with several yellow lines, and the feelers are short and black, but yellow at the base.

7. The *black WASP*, *with four streaks on the belly*, every where yellow, is less than the common Wasp, and has black feelers, that are broad in the middle. The breast is black, and speckled with yellow. The first joint of the belly is black, and marked on each side with a yellow spot. The second, third, fourth, and fifth segments are also black, but there is yellow all round the edges. The feet are black, with a pale colour here and there. It hides itself in the sand.

8. The *smooth black WASP*, *marked on the belly with three yellow lines*, is of the middle size, and all over black, except on the forehead, where there is a white spot. The belly has three segments, which are yellow at the edges, two of which are near each other, and the third at a distance.

9. The *smooth black WASP*, *with three yellow streaks on the belly*, the third of which is remote from the other two, has black feelers, only they are yellow at the base, and near the head there are two yellow spots. The second segment of the belly is marked with an oval spot on each side, and the fourth is marked with a yellow line, but interrupted behind. The fifth is marked with a fallow coloured contiguous line, and the belly below is quite black. The legs are yellow on the outside, and fallow-coloured within, but the feet and thighs are black. It is as long as the common Fly, but not so broad.

10. The *WASP*, *with a black breast and a yellow line*, has also the belly with black segments, that are yellow on the edges, and the first and second are of a rusty colour. It is of the size of a common Wasp, with a black head and yellow jaws, besides a yellow speck between the feelers. There is a yellow line on each side the head, and the six segments of the belly are black, except the edges, which are yellow. The legs are of a rusty colour, and the feelers are black.

11. The *WASP*, *with the feet and jaws yellow, with the incisures of the belly smooth and black on the edges*, has yellow eyes, mouth, and feet, and the breast and belly black. The wings are of a sea-green colour,
and

and veiny; but the breast is hairy. There is a yellow spot near each wing, and the upper jaw is flexible, pointed, and hollow. It is of the size of a Hornet.

12. The *black WASP*, *with yellow jaws and feet*, is not so large as a common Fly, and the colour is quite black, except the feet and jaws.

13. The *black WASP*, *with yellow feet and forehead*, is of the size of the former.

14. The *black WASP*, *with the first joint of the belly like a funnel*, is of the size of the common Bee, and is all over black, except the edges of the segments of the belly, which are yellow. The breast is black, only there is a yellow spot at the base, and another on each wing.



C H A P. IX.

Of Insects of the Ant kind.

ACCORDING to *Swammerdam*, the whole of an Ant is divided into the head, breast, and belly; in the head the eyes are entirely black, and under the eyes there are two small horns or feelers, which are of a chestnut or brownish colour, each of which are composed of twelve joints, placed end to end, the first of which is longest. All the different joints are covered with fine silky hair, and the mouth is furnished with two crooked jaws, which project outwards; in each of these there are seven incisures, that appear like so many little teeth. The breast is formed of several joints, each of which are divided into six pointed projections, which become more visible towards the loins; and the loins themselves are composed of three knots or buttons, which resemble vertebræ, and are quite covered with silky hair. Under the breast there are six legs, that are pretty strong and hairy, composed each of four joints, of which the last, which makes the foot, properly so called, is formed of four other smaller joints; and that at the extremity is armed with two small claws.

The head and breast are covered with a streaked and crenelated skin, as hard as horn, which is like the disposition of the fibres of the wood of the wild pine, when it is cloven in places where there are knots. The belly is more reddish than the rest of the body, which is of a brown chestnut colour; it is as shining as glass, and covered with extremely fine hairs.

Of the ANT, as well as of the Bee, there are three kinds. This is the description of the working Ant, which appears to be neither male nor female; but which is designed only for labour, that is, to gather provisions, and to take care of, and nourish the brood. The male Ant resembles the working Ant, with regard to the teeth and feelers, only the teeth are a little less, as well as those of the female Ant. On the other hand, the eyes are much larger; and there are three points, somewhat like pearls, on the head of the male, which render him quite different from other Ants, and which are in reality other eyes, of a singular kind. But the breast is very different from that of others, with regard to the colour and structure; besides this, there are four remarkable wings, of which the two foremost are near twice as large and as strong as the hindmost. The structure of the limbs and belly are also different in some respects. Besides, all the rest of the body is larger, and of a blacker colour. However, the males of Ants, we are now speaking of, are not different from the rest, with regard to their Aurelias, but these are not to be met with in all seasons of the year in the Ant-hills; which renders it probable, that the working Ants kill the males, after the time of breeding is past, because they are of no other use than for propagation.

As for the female ANT, she is the largest of all, and when she is anatomized, the exceeding small, white, oval eggs, may readily be discovered. She has teeth, eyes, and feelers, like the former, and behind the head there are three eyes, resembling pearls, disposed as in the males. But she may be distinguished from the two preceding, by the colour and structure of the breast, which is a little more brown than that of the common Ant, and a little brighter than that
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of the male. The legs are much alike, as well as the loins and belly, only this is much larger, to allow room for the eggs.

The legs are smooth, polished, full, and shining, without any furrow; they are each so small, that being placed upon a black ground, they can hardly be perceived. The worm that proceeds from an egg, being viewed through a microscope, the head, the mouth, and the body, composed of twelve rings, may be discovered, the head being turned towards the breast. This small animal, though a real worm, is commonly called the egg of the Ant; but this is a mistake, for it is an animal that has life and motion, though it has no legs. It has not the least resemblance to an egg, and is often larger than the Ant itself. These are the pretended eggs, so much sought after, to feed birds of diverse kinds, and of which the nightingales are so fond.

When this worm is come to its full growth, the breast swells insensibly, and it casts its skin, and then loses all motion. All the members, which were hid before, then begin to appear, and shew the true form of an Aurelia, which represents, very distinctly, all the parts of the animal, though they are yet without motion, and as it were wrapped up in swaddling cloaths. But it must be observed, that in this state the animal regains its former softness, and all the members are as white as the curds of milk. The parts of the Aurelia are kept united, under a uniform skin, like those of a Butterfly in its Chrysalis state; in short, there is no other difference between the parts of the Aurelia, and those of the Ant, but that in the latter they appear more distinctly than in the former. However, in reality, the egg, the worm, the Aurelia, and the Ant, are only one and the same animal, hid under accidental different forms. When this insect has passed thro' all the changes, and has acquired the greatest strength it can have, it quits its last skin, to assume the form it will retain ever after.

We have already hinted, that the working Ants have the care of the education of the brood; and this they perform with extreme application, omitting nothing that is requisite thereto. They carry them
about

about in their mouths, between their teeth, with extraordinary care, for fear they should come to any hurt. I have kept, says *Swammerdam*, several of the working Ants in my closet, with their eggs and worms, in a glass filled with earth. I took pleasure in observing, that in proportion as the earth dried on the surface, they dug deeper and deeper thereinto with their eggs; and, when I poured water thereon, it was surprising with what care, affection, and diligence, they laboured, to put the brood in safety, in the driest place. I have often seen, that when water has been wanting for several days, and when the earth was moistened after it a little, they immediately carried their young ones thereto, which I have seen stir and suck the moisture.

Derham informs us, *Sir Edward King* examined the generation of Ants, with a great deal of diligence, and he found their greatest care regarded their eggs, which are of a fine substance, and as white as loaf-sugar. When they happened to be dispersed, they gathered themselves together, and laid them in a heap, sitting thereon in great numbers, as it were to keep them warm. In summer, they carry their young ones every morning to the surface of the earth; insomuch that, from ten in the morning, till five or six in the afternoon, they may be found near the surface, and generally to the south of the mole-hill where they are buried; but when the weather is cool, or it is likely to rain, you may dig a foot deep before you can meet with any. *Swammerdam* has observed, that Ants follow the motion of the sun, and that they transport their young from one place to another, according to its course; that is, they are always careful to carry them to those places, where the earth is heated by the rays of the sun.

It were to be wished, for the honour of Ants, that all those things which have been said of them were true, as much as their tenderness for their young. In particular, their foresight and their care in laying up provisions in the summer, to serve them in the winter, and their gnawing one end of the corn, to hinder

hinder it from growing ; for the truth is, they have neither corn in their Ant-hills to gnaw, nor magazines wherein to lay it ; nor yet do they want it, for in the winter they are not able to eat. This is true, according to the experience of two great naturalists ; and *Swammerdam* affirms, that he could never perceive in the Ant-hills the several apartments artificially constructed, and disposed according to the laws of architecture, as authors have pretended ; nor could he observe that they laid up provisions in the summer for the winter. *Reaumur* tells us, that it is well known, that several sorts of quadrupedes, such as Bears, Marmouts, and Field-mice, pass part of the winter, without taking any nourishment. It is said, that they sleep at that time ; but if they do, it is not like their sleep at other times. *Sanctorius* has found out, by experiments made for that purpose, that while we are at rest, the fluids circulate much slower than at other times ; whereas, in the animals that pass several months without eating, the motion of the fluids ought to be extremely slow ; insomuch that they are in a kind of lethargy, or benumbed state, and can be hardly said to live. Almost all insects, in the winter time, take no nourishment, and are in such a torpid state, that they seem to be dead. Every insect that is to live a year, after it is come to its full growth, will pass four or five months, without taking any nourishment, and will seem to be dead all that time. The Ant in particular, says he, so much cried up for his industry and foresight, and for its laying up magazines for the winter, has none of those fine qualities ; for after hundreds and hundreds of enquiries, I have found that they never lay up provisions. When they carry any corn, or other grains to their habitations, they carry them exactly in the same manner, as they do bits of wood, for the construction of their houses. For what purpose should they lay up corn against the winter, since they pass that time heaped upon each other without motion ; they are so far from being able to gnaw grains of corn, that they are not so much as able to move. This single circumstance may inform us, why all these historical facts,

facts, so much boasted of by authors, ought to be examined over again. The greatest prudence that Ants discover, is in sheltering themselves from cold as much as possible, because when it is severe, it always deprives them of motion.

About the beginning of *March*, or as soon as the weather begins to be warm, they begin to appear, and go abroad in search of nourishment. I have kept, continues he, several hundred of very large Ants, during the winter, in large tubs; and have afterwards continued the cold, sufficient to keep them torpid, during the months of *March*, *April*, and *May*, and they have not seemed to suffer at all thereby. When they have been placed in a warm air, they have discovered as much vigour, as those that have not slept half so long.

Francis Carre, who tells us he has studied these insects near twenty years, supports the reasoning of *Reaumur*, with regard to their lethargy, during the winter. The climate of *Languedoc*, being more hot and dry than that of *Paris*, and Ants being there much more common, I have examined, says he, their hills in all seasons of the year, and could never find these pretended magazines, composed of several chambers, that communicate with each other by galleries, and which are dug so deep, that neither rain nor snow could hurt them; from whence I am authorized to determine, that the common opinion is erroneous. It is true, that if corn be thrown on the Ant-hills, the Ants will get about it immediately, and carry it from place to place. Then, if it be opened, the corn will be found, that they could not consume; but if the same be done at any other time, no provision can be found. When the corn thus hid, begins to ferment and corrupt, the Ants carry it out of their holes, with as much activity as they had laid it up. They have likewise the precaution to make a bank above the entrance, near six inches high, and to make several roads to go out and in by the highest part. This elevation consists of small bits of wood, the fibres of plants, and earth, and it serves them instead of a causeway, to turn aside the water. In forming this, they work more or less, according to the nature of
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the soil, and are apprehensive of nothing so much as water. From *May*, or the beginning of *June*, according to the state of the season, they work continually, till bad weather comes on. Their wonderful activity entirely regards their brood, which come into the world during the fine weather. It has been said, that common Ants feed out of their subterranean habitations; which is a mistake, except in two cases. When they attack fruit that is juicy, they will tear it into small bits, and each will carry home its load; but if they should happen to meet with fruit immersed in syrup, and they find it impossible to carry it away, on account of that fluid; yet they will make all possible trials to come at the fruit, which they cannot effect, because the syrup will inviscate their feet, and consequently they must perish therein. But when at other times they meet with nothing but a sweet liquor, every one can carry away some of it, to feed their young; for they do not devour it all themselves. When the places round an Ant-hill are barren, they will sally out on all sides, in search of provisions; and if they meet with any thing that is heavy, several of them will endeavour to force it along; for some will drag, while others push; but if their efforts are vain, they will divide it into small parts, and carry them to their common magazine. If any one among them makes a happy discovery, it will give advice to others, and then immediately the whole republick will put themselves in motion. They make two tracks, the one for those that go to seize the booty, and the other for those that return back loaded. If any one of them happen to be killed, others will carry them away to some distance. When the cold season returns, they all fall into a sleep, as before observed, and continue in this state, till the air is warm enough to render them active.

When the Ant has acquired a certain number of years, but how many is not determined, large wings will appear, during its lethargy, and then its inclination will be entirely changed; for as soon as warm weather permits them to get abroad, they forsake the rest, and proceed to a wall, a stone, or a tree, where

where they shake their wings, to enable them to rise in the air. Those that are thus furnished with wings, perhaps may be a fourth part of their whole number. Some think they become winged at the age of four or five years.

Carre also observes, that Ants send out swarms once a year, and that the young can build their habitations without the help of the old. They seem at first to mind nothing but their work; but as soon as their subterranean habitation is advanced, part of them go in quest of provisions. They take up with the seeds of trees, shrubs, and plants; and with bread, flesh, and insects, dead or dying, not excepting Spiders themselves. *Carre* likewise confirms, that the old account of their habitations, with their exact proportion, vaults impenetrable to water, with the beams, spars, galleries, and magazines, formed with inimitable skill, are nothing but mere fictions. What authors have dignified with the name of a magazine, is nothing but a cavity, which serves for a common retreat, when the weather forces them to return to their lethargick state. Hither they carry their provisions for daily consumption, and make it as it were a common dining-room. This cavity is not above a foot deep at most. When Ants meet with plenty of corn, that is, more than they can consume, they lay some of it up in lesser cavities, and these are all their ordinary or extraordinary granaries. When any grains of corn begin to corrupt, they carry them out of their habitations, and abandon them, as observed before. When they meet with something they like, they carry it directly into their common room. When provisions are scarce, they come to short allowance; but they always give their young what is necessary. What *Carre* says about all the Ants having wings some time or other, does not agree with the observations of *Swammerdam*, nor with those of *Linnaeus*, who allow that the males and females have wings; but deny that the working Ants have any.

After all, nothing can be more laborious than this insect, insomuch, that even the very stones, over which they pass and repass, will be worn into tracks
more

more or less. They are so very fond of flesh, that they will not only feed upon the carcases of May-Bugs and Beetles, but if you throw a Frog, a Lizard, a Serpent, or a Bird, among them, you will find their skeletons in a few days time, left in the highest perfection; and they will be better prepared, than by the hands of the most skilful anatomists. There is some danger in making them angry; but then they do not bite, as some have supposed, for they have a small sting, and the pain that is caused does not proceed so much from that, as from an acrid fluid, which they let fall into the wound, from whence proceeds a little swelling and an itching.

ANTS have a great many enemies, and particularly the Wood-pecker, and all sorts of Pyes. It is now commonly known, that the Ant-Lion is the most formidable enemy to Ants, which is particularly taken notice of elsewhere in this treatise. The Ants, that are found in gardens and orchards, are of a different kind from those in the fields and woods, and are much hated by gardeners, because they are supposed to do a great deal of mischief. For this reason, authors have pretended to discover several secrets, in order to destroy them, such as tallow, ashes, unslacked lime, foot, oil of aspic, oxes gall, saw-dust, hog's-dung, mixed with urine, chalk, glue, cow-dung, pounded sulphur, the fumes of sulphur, and many other things. However, many things are laid to their charge, which they are not guilty of; for there are green Pucerons, that spoil vast numbers of flowers, and cause the leaves of peach and pear trees to curl up, casting about them a sweetish liquor, which the Ants are fond of; but then they neither meddle with the plant nor the Pucerons; and it is these that do the mischief to the trees, which they lay to the charge of the Ants.

We are told by *Bontius*, that, in the *East-Indies*, there are flying Ants, of a red-colour, which gather from flowers, trees, shrubs, and herbs, a substance wherewith they make gum-lac. However, authors are not all agreed, with regard to this circumstance. *Geoffrey* observes, that the name of gum is improperly applied to this substance, for it is rather a wax. The most

most remarkable of this sort is stick-lac, because it is brought over upon the very branches on which it is formed. Some have thought, that it has proceeded from the trees themselves; but this cannot be true, because if you make an incision into the tree, nothing will proceed from it. It is therefore most probably a sort of comb, like that made by Bees, and other working insects; and in reality, where it is broken, it is divided into cells, of a pretty uniform shape, which is a certain proof, that it is neither a gum, nor a resin, that flows from trees. Hence it appears, that lac, which has a fine smell when it is burnt, is nothing but a kind of wax, that forms the body of the comb.

There was a sort of lac brought from *Madagascar*, which was examined by *Geoffroy*, who was of opinion it was a real comb; for it differed very little from common wax, either in colour or smell. The pieces were thicker than those of common lac, and the colour was nearly like that of amber. However, the lac of *Madagascar* is not like that of *Pegu*, for it is neither fit for tinctures, nor to make sealing-wax. The analysis of lac will still confirm this opinion; for this and common wax yield much the same principles, namely, an acid spirit, and a butter.

Aldrovandus reports, that in *Brazil* there are large winged Ants, that smell like cedar, and that have a very agreeable taste; they are so numerous, that they appear like a thick cloud in the air. We are informed in the *German Ephemerides*, that on the 18th of *July*, in 1679, when the weather was very hot, but close and cloudy, there was seen a cloud of winged Ants, that flew from the north-east to the south-west, on the side of the river *Danube*. The town of *Posen* was full of them, for a vast number fell down, that perhaps could fly no further; insomuch that, in the market place, no one could set his foot without killing thirty or forty at a time. Their flight did not continue above a quarter of an hour, and when they fell, they lost their wings, and only crept about slowly here and there. In shape they resembled common Ants, but they were larger, and had two transparent wings.

In *Africa*, and particularly in *Guiney*, the Ants are exceeding troublesome, and do a great deal of mischief. They make their nests twice as high as a man, of earth in the fields; besides which they build large nests in high trees, from which places they advance to the *European* settlements, in such prodigious swarms, that they frequently oblige the inhabitants to quit their beds in the night-time. They will sometimes attack a living sheep, which in a night's time they will reduce to a perfect skeleton, leaving not the least thing except the bones. It is common for them to serve domestic fowls in the same manner, and even the rats themselves cannot escape them. If you place a Worm or a Beetle where only one or two Ants are, they will immediately depart, and bring with them above an hundred; after which they seize their prey, and march off with it in good order. These Ants are of various sorts, some great, others small, some black, and others red; the sting of this last is very painful, and causes an inflammation; the white are as transparent as crystal, and have such strong teeth, that in a night's time they will eat their way through a thick wooden chest, and make it as full of holes, as if it had been penetrated by hail shot.

There are also several sorts of Ants in the *East-Indies*, whose numbers are prodigious; some of them are exceeding large, and of a ruddy colour, inclining to black, and some have wings, but others have none. They are very pernicious to the fruits of the earth, and do a great deal of mischief in houses, unless great care is taken to prevent them. It is remarkable, that if one Ant meets another that is laden, it always gives way to let it pass freely.

1. The **HORSE-ANT** is the largest of this kind in *England*, being twice as big as the common sort; it has a black head, and has a breast of a dusky iron-grey colour, only it is black towards the hinder part, and white at the other extremity. The legs are iron-grey, and the scale, which is placed between the body and the breast, is of a roundish oval figure, pointed at the top, and undivided; the body is brown, and consists

sists of five segments. It is usually met with in hollow trees.

2. The *red* ANT is smaller than the common sort, having a small head, and a large breast; and the scale, which separates that from the body, is of a roundish shape, and slightly dentated. The legs are slender, the wings very thin, and of a brownish colour. It is met with in dry pastures, on the leaves and stalks of the smaller weeds.

3. The *black* ANT is neither so large as the common sort, nor so small as the red Ant, its head is large, in proportion to the body, and the breast is flatted, being at some distance from the hinder part. The scale that separates them is of an oval shape, and undivided on the edges; the legs are longer and slenderer than in the other kinds. It is met with in heaths, and in dry pastures.

4. The *American* ANT is of a very large kind, and so voracious, that they will devour all the leaves of a tree in a night's time. They have two crooked teeth, which meet each other like nippers, with which they cut the leaves of trees, and other things that they feed upon. They sometimes cut them off, and when they are fallen to the ground, they carry them to their nests to feed their brood. These Ants, when they are arrived to their full growth, shed their coats in the same manner as Flies that proceed from Caterpillars, and then become winged insects, in which state they lay their eggs. They make their holes in the earth of a great depth, and build their nests very artificially. They are great enemies to all other insects, and when they rove abroad, which is always once a year, they will go into every room of a house, and kill all the Spiders and other insects that are therein.

The *American* VELVET ANT is of the size of a Hornet, and the body is elegantly marked with black and crimson velvet. The breast is so strong and hard, that though they are trod upon by men or cattle, they receive no harm. They have a long sting in their tails, which occasions great pain and inflammation.

The ANTS of *Brazil* in *South-America* are very numerous, and devour every thing that comes in their way,

way, whether fruit, flesh, fish, or insects. There is also a flying Ant, an inch in length, with a triangular head, and the body separated into two parts, being only joined together by a small string. On the head there are two slender and long horns, or feelers, and their eyes are very small. On the fore part, or breast, there are six legs, consisting of three joints, and they have four thin transparent wings, the hindmost of which are round, and are of a bright brown colour. They dig into the ground like moles; but they are eaten by the negroes.

There is another large ANT, resembling a Fly, whose body is separated into three distinct parts, the hindmost of which, for shape and size, resembles a barley-corn; the middlemost is of an oblong shape, with six legs, each of which is near half an inch long, and consists of four joints. The fore part, or head, is pretty thick, and in the shape of a heart, with two horns or feelers, and as many black crooked teeth. The eyes round the pupils are inclining to black, and the fore and hind parts of the head are of a bright red colour.

There is also a bright black ANT, with bright rough legs, near an inch in length, with a large four-square head, and prominent black eyes and teeth, with two horns or feelers, near half an inch long. The body of this is also separated into three parts, the foremost of which is of an oblong shape, but not very thick, with six legs, each of which is near half an inch long. The middle part is small and square, not exceeding the bigness of a louse. That behind is the largest of the three, and is of an oval figure, only it is sharp at the end. The three parts are fastened together by a sort of a string.

The *chestnut-brown* ANT is also a native of *Brazil*, and has a head as large as that of other Ants, with two horns or feelers, and two tusks instead of teeth. The whole body is covered with hair, and is divided into two parts, the foremost of which has six legs, and is somewhat less than that behind. At certain seasons of the year it has four wings, the foremost of which

which are somewhat larger than the hindermost, but it loses them again after a certain time.

Linnaeus takes notice of four sorts of ANTS, namely, the horse Ant, the red Ant, the black Ant, and the corn Ant.



C H A P. X.

Of FLIES of the Gnat kind, which have very slender snouts or trunks, like threads.

THESE sort of FLIES are much more troublesome in hot climates than with us, though in low, marshy places, our countrymen have sufficient reason to complain of them; however, their bite is not near so painful as those of the Gnats between the *Tropicks*. There is one sort in *Peru*, which are called Muskitoes, that are so small, they are almost imperceptible, and yet their bite gives a sensation, like the burning of hot iron. Other Muskitoes are like our Gnats, and are of two sorts, whose bites are extremely painful, and raise large bumps on the skin. They are so numerous, that they darken the air by their multitude, insomuch that those, who travel in the woods, are obliged to have a cotton covering, or net, to keep them off, and the poorest *American* is never without one.

Pere du Tertre observes, that in the *Caribbee-Islands* there are Flies, not unlike our common Gnats, and probably are the same as those just mentioned. Whenever they get to the skin, they suck out the blood, and are always bred in marshes and standing waters. At first it is a small worm, not thicker than a hair, and of the length of a grain of corn. After they are changed into Gnats, there are such vast numbers of them, that they darken the air, especially in the morning, two hours before the rising of the sun, and as many after he is set. When any one stops, these little tyrants come buzzing about his ears in such a troublesome manner, that he often loses all patience. If he wants to go to sleep, they fix upon every part
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of his body that is uncovered, and thrust their small snouts, which are so fine that they can hardly be seen, into the pores of the skin, and as soon as they meet with a vein, they are sure to suck out the blood. If they are let alone, they will swallow so much, that they can hardly fly after it. The original natives of these islands make a fire under their beds, that the smoke may drive them away; and even some of the *European* inhabitants, that live in low grounds, and upon the edges of woods, are obliged to make use of the same remedy, and even to smoke their houses with burnt tobacco. But the method to keep them off, is to hang cotton nets round the bed with small meshes; for these small insects, having large wings, are not able to get through them. He also observes, that some Muskitoes are no larger than pins points, and yet they always leave purple marks on the skin. However, these are only met with on the banks of rivers, where the wind seldom or never blows.

It will not be improper in this place to take notice of some other Flies, common in the *West-Indies*, but not known in *Europe*. One of these is an inch and a half long, and an inch broad. They are also flat, and not much unlike Beetles. They have such hard and strong teeth, that they will gnaw and eat a passage into the heart of the very hardest trees, where they make their nests. Another sort of Flies are only seen buzzing on the surface of the earth, immediately after rain, when the sun shines. They are remarkable for the manner of making their nests, which are built with the leaves of trees, which they make of a round figure with their teeth, in such a manner, that of two leaves they form a sort of basket, by laying them one upon another, taking care that there be a hollow space between them, in which they conceal themselves, and lay their eggs.

And now we are speaking of the *West-Indies*, this may be as proper a place as any, to take notice of the Hornet-Fly, which is not unlike a Flying-flag, a Fly so called, with branched horns like a flag. They have a black small head, covered with orange-coloured

hair, as soft as silk. Their eyes are round, as clear as crystal, and of the size of small peas; and they are so hard, that there is no breaking them, without the help of a hammer. This small head terminates in the shape of a horn, turned up, and armed with four teeth, like the nippers of a cray-fish. This horn is black, as hard and as well polished as jet, and about two inches in length. But the most remarkable thing of all, is its having a joint above the eyes, which has a motion; for the head is covered with a sort of helmet from the head to the wings, where it terminates in another horn, three or four inches long, and bending downwards, reaches the joint of the other, and makes a sort of nippers like those of a cray-fish. This horn is of the same substance as the first, except its being bordered with short hair, as soft as velvet. They can lift up, or let down the helmet at pleasure; but it is observable, that the males only wear them.

There are two other sorts of FLIES at *Martinico*, the first of which is horned like the former, only the two horns are of an equal size, and placed on each side the head, though they meet together like nippers, when the insect pleates. These horns are probably their feelers. The other species is only an inch and a half long, and one broad, the upper part of their wings are hard, and of a green colour, only they are striped with silver rays.

The WALKING-LEAF is an insect brought from the *Spanish West-Indies*, and has a very flat body, of a reddish colour, like that of certain dry leaves; that is, at some times of the year, for at first it is green. It is produced from a green egg, as big as a coriander seed, from which in a few days proceeds a little black insect, like an Ant when just hatched. The wings are at first like a green leaf, and have fibres run along them, from the inward edges to the outward, much like those of many leaves, and they branch into subdivisions, as they come nearer the edge. On the fore part of the body are four other small wings, which though they differ among themselves, each pair being of a different shape, yet they exactly resemble some
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The Walking Leaf. 200



The Green Horse Fly of China. 137



*The Horse-fly of y^e West Indies,
137*



The Plumid Moth.

fort of leaves. The larger wings being shut, it exactly resembles a leaf, which has been the reason why it is called the Walking-Leaf. The eyes are small and prominent, and the mouth is forked; the head is round, and about the neck there is the resemblance of a ring, of the same colour with the body. Behind this the neck enlarges again, insomuch that it looks almost like another head, but larger. It is above three inches long, and an inch and a half broad. But to return to the Gnats.

Some place the *TIPULÆ* among the Gnats, but improperly, though they cannot be distinguished from each other, without the assistance of a microscope. *Reaumur* informs us, there are three sorts of Gnats in the fields about *Paris*, the largest of which has a body variegated with white and black, and on the breast there are black and very brown undulations. A lesser kind resembles the former, in the colour of the breast and eyes, but the body is brown. The third kind is less than either, and is most common. It has a light reddish-brown breast, and a whitish body; but under the belly, on each ring, there is a brown spot, and the rest is grey; the eyes are of a very fine green.

GNATS in general have a longish body, nearly in the shape of a cylinder, consisting of eight rings. The corslet, though short, is considerable for its size, and to this the legs and wings are connected, besides the two balances or mallets. There are also four marks, placed much in the same manner as in other Flies; the two first of which are pretty near the head. When the Gnat is at rest, it generally keeps one of its wings crossed over the other, so as to cover it. The feelers are finer in the males than in the females, and in several kinds there are two small longish bodies on the head, of a round shape, which have some resemblance to the feelers of short bodied Flies. *Reaumur* calls them Barbs, because the trunk of the Gnat is placed underneath them. The trunk of the Gnat is a very fine instrument, and is different from that of the Fly, for its sting, or rather stings, are contained in a sheath. It seems to be designed purposely to bore the skin, and to suck out the blood. *Swammerdam*

calls the sting a kind of reddish shining thread; but *Reaumur* has discovered, that it consists of several threads, which may be divided from each other. The sheath for this seems to be a cylindric pipe, though in reality it is cloven almost throughout its whole length, and the edges of the cleft recede from each other, when there is occasion.

When a GNAT sucks the blood without disturbance, he seldom quits the place till he has filled his stomach and guts with it. When the bite of a Gnat is perceived immediately, there is no better remedy to cure it, than to moisten the liquor with water, which is left upon the wound; and this may be easily done, by rubbing in the water immediately; or the wound may be opened a little, and then it needs only be washed. But if the bite is not perceived till several hours after it is done, this remedy will have no effect.

GNATS proceed from a sort of water Worms, that are found neither in rivers nor brooks, but in ponds and splashes of water in marshes, from *May* till the beginning of winter; for this reason, all marshy places are terribly infested with Gnats, and rainy seasons produce more than dry. The body of the worm is longish, with the head joined to the first ring of the body by a sort of neck. This ring is thicker and longer than the rest, and seems to be a kind of corslet, which is succeeded by eight others; that is, there are nine in all, and they gradually grow less to the end of the tail. It changes to an *Aurelia*, with a whitish body, and a greenish corslet, which soon turn brown.

The *great* GNAT is twice as big as the common Gnat, though it is much of the same shape; for it has a long slender grey body, and large thin transparent wings, without spots. The snout or trunk is prominent and slender, and its sheath is forked at the top, or formed into two leaves, which are hairy, and of the shape of a lance. It is very common about the waters, and while in its worm state lives in the water.

The *Humble-Bee* FLY is placed in this class, on account of the structure of its sucker or snout. It is very like a common *Humble-Bee* in its shape, and even in its size. It is covered with extremely thick down; its

its body is short, roundish, and obtuse, and its colour black, but of a reddish brown on the side. The trunk or sucker is long, which it always carries thrust out; the wings are partly brown, and partly whitish, and a great deal of down on the body is white, which, with the blackness below, has a very uncommon effect. It is very common in gardens, where it sucks the honey out of the flowers.

The *little GNAT* is considerably smaller than the common Gnat, and has an oblong slender blackish body, with a large head and eyes; the wings are long, narrow, and of a dull white, with three dusky spots near the outer edge. Its bite is attended with pain, and makes a mark that remains for some time. It is common in woods, and about waters.

Linnaeus takes notice of six kind of GNATS, namely,

1. The *dusky GNAT*, with a forked snout, *Ray* takes to be the female of the Domestick Tipula, because it does not bite or sting. It is of an ash-colour, and twice as large as the following. It has no points on the wings, and from between the jaws, or more properly from the trunk, there proceeds a forked dart.

2. The *ash-coloured GNAT*, with eight rings on the body, is the common Gnat, which is met with almost in all parts.

3. The *GNAT*, with wings of the colour of water, marked with three black spots, is by some called the least GNAT with blackish spots, it being no bigger than a small flea, of a brown colour; but the wings are white and narrow, marked on the outer-edge with three dark specks. When the wings are shut, it appears like three brown streaks.

4. The *black GNAT*, with the wings of the colour of water, black feet, and a white ring, are found in prodigious numbers in *Lapland*, in the dusk of the evening, and they make a great noise. They will bite any part, even the eyes, mouth, and nose, and are not easily driven away. They are very small in shape, and resemble a common Fly, but are no bigger than a Flea.

5. The *downy GNAT*, with wings in part of a dusky colour, is found in gardens, where they fly about with-

out ceasing, and seem to delight in the smell of the flowers. It is called by *Ray* the Gnat shaped like a Silk-worm Moth, all over hairy and black, with a blunt hinder part of the body, and red sides.

6. The *black GNAT*, with a dusky body, and a white forehead, in the Transactions of *Upsal*, is called the blood-sucking least Fly, with white wings. It is very troublesome to horses in the summer season, especially in *Northland*, where it gets among the hair and sucks the blood. It is more fond of horses than men, and cannot be driven away. The feelers are like threads, though it is in the shape of a Fly; and the head, feet, and breast are black, only on the sides of the breast it is of an ash-colour, and there is a white spot above and below the eyes.



C H A P. XI.

Of flying insects of the TIPULÆ kind.

BY TIPULA was formerly understood nothing but the Water Spider, of which they knew only two sorts; but now the catalogue is greatly enlarged, and it is plain from *Linneus*, that other sorts are meant, besides those that frequent the water; though he mentions only seven, namely, the variegated Tipula, that of roots, that in the shape of a Gnat, the febrile Tipula, that of the Asparagus, that with bended wings, and that of the Juniper-tree. He makes the characteristic of this kind to be the mouth, furnished with crooked and jointed feelers.

That described by *Mouset* is almost in the shape of a spider, with an oblong slender body, and four legs fixed to the breast. Near the mouth there are two arms, which some take to be feelers, and are most probably really so; for this insect makes no use of them when it runs, and they are twice as short as the other feet. It has four very weak wings, which seem to be of no great use in flying, though they are for leaping. They are shorter than the body, and the upper pair are thicker and broader than the lower,
and

and are of a dusky blackish colour. The lower wings are less, more slender, and of a silver colour. They are often seen leaping upon the water, but so lightly, that they seem to make no impression on it at all; however they are not constantly in motion, but by starts. It does not dive into the water, unless forced thereto, and then its body does not seem to be at all wet with it. It is to be met with in standing waters, where there is but little wind throughout the summer. It is sometimes met with in rivers, especially near the banks, and under the shade of some tree, as for instance the willow; and there are generally many of them together.

Insects of this kind of other authors, are,

The TIPULA, *with whitish wings*, which is the gayest of this kind; it has a body that is oblong and slender, of a greyish-brown colour, and a cloven tail. The legs are long and slender, the head large, and the eyes like net-work; the wings are large and very beautiful, and have a brown line running down the outer side; from which proceeds another smaller towards the other side; between these there is a large snow-white spot. It is called by *Ray* the greatest Tipula with large wings, variegated with brown and white.

The *painted* TIPULA has a long slender body, beautifully variegated with a deep glossy black, and a bright yellow, and the breast is also of the same fine black, speckled with yellow. The wings are large and brownish, with dusky veins, and an obscure spot on each towards the edge; but the legs towards the top are yellowish. It is called by *Ray*, the beautiful Tipula with a black back and shoulders, and a saffron-coloured belly.

The SEA TIPULA is very like a Gnat, and has an oblong-brown body, with a large beautiful green breast; the feelers of the male are feathery, and of the female snaggy. It proceeds from a long slender bright-red worm, composed of twelve joints. It lives in the sea, in clayey or sandy cases, of a great length. There are others of this kind; but their variations are so trifling as not to need any particular description.

C H A P. XII.

Of CATERPILLARS.

A CATERPILLAR is an insect that appears first in the spring, and proceeds from the eggs of a Butterfly. Whoever walks in fine weather, will find them upon trees and plants, but their condition is transient; for, having been first produced as an egg, they soon become Caterpillars, soon after are changed into *Aurelia* or Nymphs, and lastly become Butterflies, in which state they die.

The CATERPILLAR has always a body longer than it is round; composed of rings, which are membranaceous; and, generally speaking, twelve in number. The head of the Caterpillar is connected to the first ring, the neck being so short that it is scarcely visible. The head seems to be covered with a shell, and their jaws are armed with two large tusks, which are equivalent to the want of the rest. When the mouth is shut, these teeth are always uncovered, so that it is with ease that the Caterpillars cut leaves in pieces, when they are feeding upon them.

All CATERPILLARS have at least eight legs, of which the first three on each side are usually shelly or horny, the rest of the legs are membranaceous, and lengthen or shorten at the pleasure of the insect. The number of the shelly legs is invariably six; for they are always fixed on each side to the three first rings, of which the insect's body is composed. These are called the fore legs. The membranaceous legs vary in number, being sometimes found to amount to sixteen, and sometimes not to above two. When there are but two membranaceous legs, they do not immediately follow the shelly legs, but are fixed at the very last ring of the body, and from hence they have been called the posterior legs. Those insects, which have the membranaceous legs more numerous, have them placed on the rings between the fore and the posterior legs, and they have therefore received the name of intermediate legs. It is particularly from the number and the arrangement of these last, that Caterpillars have been classed.

Reaumur

Reaumur divides Caterpillars into several classes; the first of which are those that have eight intermediate legs, four on each side; that is to say, sixteen in all. Their eight intermediate legs are connected to the four rings that follow each other. The largest Caterpillars, and those that are most commonly seen, are of this first class.

The second and third classes consist of those that have only three intermediate legs on each side, that is to say, fourteen in all. These are generally remarkable for their industry; and the difference between these two classes, is principally taken from the different arrangement of their feet. The second comprehends Caterpillars that have no feet on the fourth, fifth, sixth, tenth, and eleventh ring; and the third consists of those that have the fourth and fifth ring unprovided with feet, and yet have a pair on the sixth, seventh and eighth, but none on the ninth, tenth, and eleventh.

The fourth class contains CATERPILLARS that have fourteen feet, six shelly, and the eight intermediate ones membraneous, placed as in those of the first class, and on the sixth, seventh, eighth, and ninth ring. The fifth class comprehends those that have four intermediate feet, that is, twelve in all. In the sixth class he places those that have but two intermediate feet, or ten feet in all.

The CATERPILLARS of the fifth class have but four rings that follow each other, which have no feet; and those of the sixth class have six rings, which are placed between the scaly legs and the intermediate legs. These two classes comprehend Caterpillars that walk in a different manner from the rest; for they proceed as if they were measuring the ground as they go; for which reason they are called surveyors.

The seventh class have no intermediate feet, they having but eight in all, that is, six that are shelly, and the two hindmost. Mr. *Reaumur* places in this class the greatest part of Moths, they having only six shelly, and six hinder legs, that is speaking in general, for some have eight intermediate legs. He will not allow any to be Caterpillars, that have not eight legs at

least; though *Ray* places in that number some that have less than eight.

There is a very great difference among Caterpillars, the principal of which is in the size and colour. Those of the middle size are about an inch long, and the diameters of their bodies is little less than a quarter of an inch. Some are only of one colour, others of different colours, some very lively and well determined; others placed in streaks of different kinds, running sometimes one way, and sometimes another; and sometimes again undulated or spotted. These differences of colours, and the manner of their being placed, serve to distinguish their kinds, according to some naturalists; though there are some that are entirely green, and others all over brown.

CATERPILLARS are also distinguished into those that are naked and hairy; for the skin of most part of the first kind is soft to the touch, but the others are rough, with hard grains; for which reason, they are called by some shagreened Caterpillars; and several of these have a horn on the eleventh ring, which characterises a distinct kind. Some place those among the naked kind, that are full of round tubercles, which comprehends most of the large kinds, that produce the most beautiful Butterflies.

The *thorny* CATERPILLARS are so called, because they are rough with such hard and thick hair, that they resemble thorns or prickles, exactly like those on plants. The hairy Caterpillars are also very different, some of them being extremely beautiful, and others exceeding ugly. They are generally looked upon as distinct kinds, though they are generally known among us by the name of Palmer Worms.

With regard to the shape of CATERPILLARS, some are more slender before than behind, and others the contrary. Some are in the shape of fish, and the bodies of others terminate in a kind of fork.

Some CATARPILLARS, when you are about to touch them, roll themselves up in rings; and when those that are hairy do the same, they look like small hedge-hogs. The small hairs, with which some of these are covered, often, upon being handled, insinuate

nuate themselves into the flesh, and raise troublesome inflammations. Others fall to the ground when the leaves are touched on which they are feeding; and others again endeavour to save themselves by running away.

CATERPILLARS, as was before observed, change their skin several times before they turn into Aurelia. The Silk-worm has been observed to divest itself of its skin not less than four times; for the first time, the tenth, eleventh, or twelfth days after being hatched. Five days afterwards it gets rid of its second covering, five days after of the third, and six days and a half after of its fourth or last skin. The Caterpillar throws off not only its skin, but every thing appertaining thereto, the hair, the cases of the legs, the scales of the head, and the teeth; insomuch that, upon seeing the cast skin or sheath of a Caterpillar, we might be apt to take it for the insect itself. This change of skin must undoubtedly be painful to the insect, and for this reason perhaps it ceases to eat a day or two before, and seems to languish; its colours grow more feeble, and its skin dries up. It agitates its body different ways, it puffs up some of its rings, and by this dilatation the skin begins to divide on the second and third ring. The crack or division extends from the first to the fourth ring; then the insect bends itself forward, to draw its head from the sheath, which it is about to leave, and then it draws in a contrary direction to get rid of the hinder part of its sheath. Lastly, the insect, having got rid of its old skin, appears with a new one, even surpassing the colours of the former, and all this change is performed in the space of a single minute. It is remarkable enough, that some Caterpillars are larger upon taking the new skin than they were with the former.

When CATERPILLARS have, in this manner, quitted their last skin, they change into Aurelia, and their Caterpillar shape remains no longer. That of the greatest number of Aurelia somewhat resembles a cone: neither wings nor legs are discovered; if they appear to have any motion, it is in the rings, of which the hinder part are formed; this is the only part that

appears animated. The Aurelia resembles an inanimate moss, and takes no nourishment whatsoever. However, from this Aurelia the Butterfly is to come; and in fact it is already completely formed within this sheath. Nay, the rudiments of the Butterfly may be discerned by the help of a microscope in the Caterpillar itself; for if the skin of the Caterpillar be removed a day or two before its last change, the Butterfly will be discovered, and all its parts be distinguished, not excepting even its eggs; but for this experiment it will be necessary to keep the Caterpillar for some days in vinegar, or spirit of wine, to give a sufficient hardness to the parts so as to bear dissection.

The CATERPILLAR most usually makes its own shell or Aurelia, though there are some that make none, and only hide themselves in the earth, or the crevices of houses or trees, and there wait for their transformation into Butterflies. Those, however, which weave or spin their own shell, (such as the Silk-worm, and most others) are found to do it from a glutinous substance, proceeding from their bodies alone, or from a mixture of this and earth, or other adventitious substances. Some days before the Caterpillar becomes an Aurelia, it discontinues eating, it gives up the contents of its stomach, and its colour grows less vivid. If it be examined just after it has spun its shell or covering, it will be found in a very languishing state, and this state continues in some two days, in others but one. After this, they bend themselves so as that the head lies upon the belly; they at certain intervals stretch themselves out, agitate their bodies, but without making any use of their legs. Thus they shorten and bend themselves still more and more, till the time of their complete metamorphosis arrives; then the insect seems to gather new strength, its contractions and lengthenings become more frequent; at length it begins to disengage itself of the posterior part of its Caterpillar covering; then by degrees disengages itself ring by ring, till it is got about half out, then the fore rings burst, and thus the insect disengages itself entirely, and its Caterpillar skin is rolled up in a small bundle, and thrust to one end of the shell

shell or pod, which belongs to the Aurelia. All this is performed in a minute's time at farthest. They next bind themselves to any substance, which they have been transformed upon, by a sort of thread, and this always by the tail, in whatever situation they may be.

The largeness of the shell is not always proportionable to the size; some make them very large and others very small, in proportion to the largeness of the animal. There are various kinds of these shells, some are entirely gummous or silky, others supply their want by the assistance of leaves, and even earth itself; and some have their situation in the earth, where they wait for their final transformation. Lastly, those Caterpillars, that live in society together, often have their Aurelia bound up together in one common packet or cake, and often with a common covering to the whole. The matter, of which the shell or chrysalis is composed, is at first soft, and contains a liquid, but by degrees it becomes harder and of a stronger consistence. Of these shells, there are of all colours, brown, green, blue, and some as beautiful as gold; but we must not suppose, that the beauty of the insect is in the least connected with that of its Aurelia; on the contrary, some of the ugliest insects have the most beautiful chrysalis. In this state the insect remains till it is changed into a Butterfly, and this continues sometimes longer, sometimes shorter, according to the different kinds. Some remain in the chrysalis state for a year, and others only for a day. In general, however, heat accelerates the transformation, and cold retards it.

CATERPILLARS, as we have already observed, proceed from an egg, and as each Butterfly lays a very large number, sometimes amounting to several hundreds, it may easily be supposed, that these insects would overrun the face of nature, if they were not lessened by several enemies. The birds in particular, in a great measure, feed their young with them; but the Caterpillar also has a more domestic enemy, and that is a sort of Caterpillar still less than themselves, which breed in their bodies, and destroy them in great numbers.

numbers. This smaller Caterpillar, or rather Worm, proceeds from the egg of a little black Fly, who settles upon the Caterpillar, and through an aperture it makes upon that insect's body deposite its eggs, which growing there, at last destroy the Caterpillar, in whose body they were bred. Former naturalists supposed, that these Worms were young Caterpillars, bred by the larger, but the researches of Mr. *Reaumur* have enlightened the natural historian in that particular.

The CATERPILLAR of the *apricot-tree* is of a purple colour, and marked with red points. It has four tufts of red hair on its back, like the oars of a boat; and there are two more on the head, which make a sort of horns, and one on the tail. It turns to a nocturnal Butterfly, whose female is without wings; and the male is of a red colour, with the wings before marked with a white spot.

The CATERPILLAR of *common worm-wood* is adorned with a white streak and brown spots. The sides are of a palish green, with brown streaks, and over each joint there is a small white spot on the fore part of the body, six small claws, eight in the middle, and two behind. In *May* they turn to black Aurelias, from whence proceed small nocturnal Butterflies, whose head and upper wings are reddish, variegated with streaks and spots that are black and brown. There is also a small white spot that shines like silver in the middle on the upper wings, but the lower are brown. These Butterflies have small black horns, and two shining eyes; they fly only in the evening.

The same plant nourishes a small long greenish CATERPILLAR, which has a remarkable walk; for it joins the hind part of the body to that before, making a sort of a hump, and proceeds forward in that manner. About the end of *July* these Caterpillars turn to Aurelias, and fourteen days afterwards small nocturnal Butterflies come out, whose head, body, and upper wings, are adorned with green, and variegated with white, black, and brown spots and streaks; but the lower wings are of a bright brown. They have also two small horns of a bright brown,
and

and four little feet spotted with brown ; and they fly very swiftly.

Albin and *Lifter* speak of another CATERPILLAR that feeds on wormwood, which is of an olive colour, inclining to brown, but changes in *July* to an *Aurelia*, and becomes a nocturnal Butterfly in *September*. *Goedard* also speaks of a Caterpillar that feeds on the leaves of wormwood, and which changes into the Solitary Fly. The same authors also mention another sort of Caterpillar, that feeds upon the leaves of sea-wormwood, and changes into a most beautiful Butterfly, which will be hereafter described.

The CATERPILLAR, *found upon ever-green privet*, is a beautiful insect, being of a dark purple mixed with red and brown. It changes to an *Aurelia* in *May*, and in *July* becomes a fine red nocturnal Butterfly, whose upper and lower wings are crossed with black lines.

The CATERPILLAR *of marsh-mallows* becomes a reddish nocturnal Butterfly.

The *pine-apple* CATERPILLAR is of a greenish colour, with a red and white streak running through the length of the body. It becomes a Butterfly, which, beheld through a microscope, seems to have the wings covered with scales, like those of fish, each of which has three teeth, with some very long hairs, and disposed in such a manner, that they may be very easily counted. The whole body seems to be covered with a sort of feathers mixed with hairs.

The CATERPILLAR *of the columbines* is small, and feeds on the flowers of this plant, turning afterwards to a small black Fly. There is likewise another Caterpillar belonging to the columbines, that rolls itself up like a ball. It hides itself in the earth before it undergoes its change, and two Flies have been seen to come out of the *Aurelia*.

The CATERPILLAR *of the tree called Areck* is very large, and is to be met with under the branches of this foreign tree. It feeds on the flowers and the fruit, and becomes a fine Butterfly, the upper part of whose wings are black, and beneath of a golden colour, bordered, spotted, and streaked with black.

The

The back of the Butterfly is adorned with small red specks.

The *meadow pink* CATERPILLAR is of a bright brown colour, mixed with black and white spots. It gets into the earth before it is changed to an Aurelia, and in the month of *June* becomes a nocturnal Butterfly, with yellow under wings.

The *Arrach* CATERPILLAR becomes a small red nocturnal Butterfly in *June*; it is of a blue green; but the Butterfly is of a bright brown.

Wild *Arrach* feeds several sorts of Caterpillars; for *Merian* speaks of a Caterpillar of a bright green, that feeds on the leaves of this plant. She continues in the same state till *August*, when she is transformed to a brown Aurelia, and on the following night the Butterfly proceeds therefrom, of the colour of a faded leaf. There is another Caterpillar belonging to this plant, of a blueish-green, which is very slow, and changes her skin four times, assuming a new one as she quits the old. On the fourth of *September* one of these produced a maggot, that was in continual agitation, which continued for fourteen hours, and then she appeared of a dusky pale colour. She continued in this condition till the 26th of *September*, and then a Fly came out, of a common form, with long feet, flat at the end, and a large head. She died on the third of *October*. *Albin* speaks of another belonging to the garden-arrach, which continued feeding till *September*, and then she hid herself in the earth, and did not turn to an Aurelia till *July* following; from whence proceeded a nocturnal Butterfly, of the colour of a faded leaf.

The CATERPILLAR of *Jerusalem artichokes* is of a brown colour, with a yellow belly, with an ash-coloured line that parts the brown from the yellow. She likewise feeds upon other plants, and does a great deal of damage in gardens. She changes into a Butterfly with yellow wings spotted with black. *Goedard* speaks of another Caterpillar, that feeds upon the leaves of this plant, and produces a Butterfly with wings as white as snow, and a body of a light yellowish colour. This Butterfly flies about, and is fond

fond of liberty. The same plant nourishes a hairy Caterpillar, that was observed to change her skin the tenth of *August*, and on the sixth of *September* she began to feed again. She began to change on the tenth of the same month, but the metamorphosis was not performed again till the ninth of *May* following, and then it became a white Butterfly.

The CATERPILLAR of the *alder-tree* is white, variegated with white streaks and spots; the head is black, and on the fore part of the body there are six feet, in the middle twelve, and behind two, that are small. Towards the end of *June* it changes into an *Aurelia*, that becomes a white nocturnal Butterfly fourteen days afterwards, spotted with black. This tree feeds several other Butterflies, one of which has two hooks, of a yellow colour, and so is the rest of the body, with a mixture of flame-colour. A Butterfly proceeds from hence, variegated with divers colours. Another of these is hairy and green. In *October* it begins to change, and at the end of *June* in the following year it turns to a dusky Butterfly, spotted with white. Another Caterpillar again is green, and produces a very beautiful Butterfly, variegated with several colours.

The CATERPILLAR of the *Ballia*, a plant of *Surinam*, is of two kinds; the first is yellow and white, with black streaks, and turns to a nocturnal Butterfly with black spots. The other is yellow, striped with black, with a brown head, that turns to a small Butterfly of an oker colour.

The *Bananoë* CATERPILLAR is of a brown colour, and the back is armed with four prickles. The tail is red, and cloven to the feet, and the head seems to be adorned with a crown. It changes to a Butterfly, called the little *Atlas*. It breeds another Butterfly of a bright green, which in *May* turns to a nocturnal Butterfly.

The *Venelloë* CATERPILLAR is brown, striped with yellow, and turns to a fine Butterfly, the under part of which is of a saffron colour, and the upper variegated with yellow, red, brown, and silver spots.

A green

A *green* CATERPILLAR of the same plant turns to an ash-coloured Butterfly.

The *burdock* CATERPILLAR is brown on the back, spotted with black, and under the belly it is of a pale yellow. On the fore part of the body there are six small feet, and in the middle there are eight. In *June* it turns to an Aurelia of the colour of silk, from whence proceeds in *July* a small nocturnal Butterfly, with the head and upper wings of the colour of silk, variegated with brown and golden spots. It has six brown feet, and flies only in the evening.

The *potatoe* CATERPILLAR is of a square shape, and a greenish-yellow colour, covered with small round red studs. It turns to a brown winged insect, streaked with yellow. There are green Caterpillars belonging to this plant, which become white and yellow Butterflies, whose wings are bordered with brown.

The *cow parsnip* CATERPILLAR is of a bright green, and changes to an Aurelia, that turns to a Butterfly, of a dusky olive colour.

The *corn* CATERPILLAR is usually met with in corn fields, and feeds upon the roots of tares. It is of a bright brown colour, streaked and spotted with one that is darker. In *September* it turns to a nocturnal Butterfly, with the fore part of the body and the wings of a greyish ash-colour, adorned with black, and on the wings there may be plainly seen the *Roman* letters B.C.V.M. on the fore part of the head there is a long brown snout, which is divided into two parts at the end, each of which is moveable every way. The hinder part of the body is of a bright red, streaked with black, and there is another streak of a greyish ash-colour. The middle of the body is hairy, and it flies in the night, making a buzzing with its wings.

The *grass* CATERPILLAR is adorned with small black streaks, and has the head and hinder joint of the same colour. It casts its skin six times, and then changes to a bright brown Aurelia, which in the month of *August* turns to a nocturnal Butterfly, with the head and upper wings brown, adorned with black.

It

It has six black horns, and the hinder part of the body, and lower wings, are of a greyish ash-colour.

The *birch* CATERPILLAR often lies upon the leaves in a semi-circle, and spins a white web, changing into an Aurelia, of a bright brown colour; from whence proceeds a small nocturnal Butterfly, spotted with a light colour and brown.

The *burrage* CATERPILLAR is green, and has six small feet before, and four behind. It also feeds upon collyflowers in *August*, and spins a white web, after which it changes into an Aurelia of different colours, some of which are brown, and others of a dark green. From these last proceed insects of a black colour, that fly like Wasps, having yellow feet and transparent wings. From the black Aurelias proceed small nocturnal Butterflies, variegated with black streaks, and long black spots. There is another burrage Caterpillar, that spins a very fine web, wherein it continues till *March* the next year, and then changes to a bright brown Aurelia, from whence in *April* proceeds a nocturnal Butterfly, variegated with black and white streaks and spots. It has two little grey horns, and four small feet.

The *bramble* CATERPILLAR becomes a nocturnal Butterfly; and there is another that is black, spotted with orange, that changes to a Butterfly streaked with grey.

The *chocolate plant* CATERPILLAR feeds on the leaves of that tree, and is black streaked with red; and the streaks are speckled with white. It changes to a nocturnal Butterfly, variegated with black streaks and spots. There is another large Caterpillar that feeds on the leaves of the same plant, and has a body covered with green and yellow sharp hair. It is very venomous, and becomes a nocturnal Butterfly, of a rose colour, with wings spotted with white underneath, and bordered with black; and in the middle there are two black spots, the one large, and the other small and triangular. There is another belonging to this plant, with little or no hair, of various colours; and over all the body there are black lines and

and circles. It becomes a very beautiful Fly, variegated with grey, sea-green, and silvery spots.

The CATERPILLAR of *the rennet*, a herb so called in *America*, has a body marked with several round raised white specks, and on each of its sides there is a white streak. On the hinder part of the body there is a horn, half white and half blue, with six small feet before, eight in the middle and two behind, of a flesh colour. In *July* they turn to Aurelias, which in *August* change to small Butterflies, whose head, fore part of the body, and upper wings are brown, with dark specks; but the hinder part is white, adorned with transverse streaks, and small black hair. The lower wings are of an orange-colour, and the eyes are black, with small black horns; and it has a trunk for the sucking of flowers. It flies so swift by day, that it is hard to be caught.

The *green* CATERPILLAR, described by *Albin*, is spotted with black; near the head, on each side the body, there are spots like eyes; and there is a kind of black horn on the head. When this Caterpillar has done feeding, it draws in its head like a sea-turtle.

The *elephant* CATERPILLAR, so called, because it has a sort of a trunk, is of a dark brown, with rings and lines on the body, of a brighter brown. It has a kind of a horn, like the former, which is placed on the tail. It changes to a very beautiful nocturnal Butterfly, of an olive green colour, mixed with that of a rose.

The *calamint* CATERPILLAR often becomes a prey to the Titmouse, that bird being very fond of it. It is always slimy like a snail, leaving a mark behind it. It is very fearful, and hides itself in the leaves of the plant, on which it feeds, which is always by night. In *October* it builds a cell with dirt and sand, and in *March* turns to a Butterfly, beautifully variegated.

The *rampions* CATERPILLAR does not change into an Aurelia till the following year, when it becomes a small Butterfly.

The *Acajou* CATERPILLAR is a native of *Surinam*, and is hairy, and as white as snow, which in *March* turns

turns to a transparent Butterfly. There is another of a red colour, belonging to the same plant, which turns to a Butterfly of the colour of wood.

The *cassava* CATERPILLAR is large and black, with the hinder part of the head as red as blood. These Caterpillars do prodigious mischief among the plants called cassava, of which the inhabitants make bread. They change to nocturnal Butterflies, beautifully variegated with black and white, and the upper part of the body is spotted with orange.

The *chervil* CATERPILLAR is of a shining green, streaked with white. It spins a slender cod, and becomes a chestnut-coloured Aurelia, which in fourteen days turns to a nocturnal Butterfly.

The CATERPILLARS of *cherry-trees* are of different kinds, that is, of as many as there are different sorts of cherries. That on the cherry-trees with double blossoms, when it is ready to be metamorphosed, spins an oval cod, which shines like silver, and is as stiff as parchment. It turns to a nocturnal Butterfly.

The *rough cherry-tree* feeds two sorts of CATERPILLARS; the first is brown, and rolls up the leaves, in which it encloses itself. It creeps very swiftly, as well backwards as forwards, and when it is touched, it descends to the ground by a thread drawn from its mouth. It spins a white cod, which turns to a brown Aurelia, and in *October* it turns to a Butterfly, of a bright brown. The second Caterpillar is yellowish, and rolls itself up in green leaves. It descends to the earth like the former, and gets up again by the thread as swiftly. It spins a white cod, which in *October* is metamorphosed to a Butterfly, of a bright brown.

The *great cherry-tree* with sweet fruit likewise nourishes beautiful CATERPILLARS; there are streaks that run cross the back, which seem to be bordered with pearls. In *July* they spin a cod, which shines like silver, and changes to an Aurelia, from whence in *August* proceed beautiful nocturnal Butterflies, variegated with black, white, grey, orange, and rose-colours. It feeds another Caterpillar of a sea-green colour, which changes into an Aurelia in the beginning of *August*, which at the end of the same month turns

turns into a Butterfly. There is also another, which is long, and of a yellowish green; it changes to a small nocturnal Butterfly, whose lowerwings are brown, and the upper green, as well as the body, which is adorned with white spots, and small brown points.

Albin takes notice of two Caterpillars of different colours, found upon cherry-tree leaves. One is yellow, marked with lines of a deeper yellow, and on each ring there are red spots. The other is entirely red, only on the two rings on the middle of the body there are yellow spots. They have both red heads, but the ring on the neck is yellow. They retreat under ground, where they first become *Aurelias*, and then nocturnal Butterflies, and lay their eggs in the chinks of trees. Some call them *Loopers*, because they bend their bodies in such a manner, as to make a loop.

Goedard speaks of another that feeds upon cherry-tree leaves, one of which began to change to an *Aurelia* on the sixth of *June*, and on the fourteenth of the same month it became a Butterfly, of a very odd colour; for it seemed to be cloathed with a patched garment, and the neck was like a piece of cloth, made up of a mixture of white and black.

The CATERPILLAR of our ladies *thistle* is of several kinds, some of which become small black Flies, and others beautiful little Butterflies. Though perhaps these small black Flies are only those, which proceed from the Worm bred in the Caterpillar's body, which, as mentioned before, produces such a Fly. *Goedard* speaks of one covered with down, and very fearful, that cannot bear cold nights. It is blackish, with prickles on the back of the same colour, only they are a little yellow at the points.

The *beech* CATERPILLAR is yellow, variegated with black spots and streaks, having on the fore part of the body six black feet, eight in the middle, and two yellow ones behind. It is very slow, and will not move when touched. It produces a small nocturnal coloured Butterfly, whose spots on the upper part are crossed with others that are red, that shine very much, and the lower wings are spotted with red.

It

It seldom flies, but keeps among the grass and on the flowers; the eggs are yellow.

The *oak* CATERPILLAR is striped with yellow and green, and when it casts its skin it becomes brown; likewise, when it casts its skin again it becomes of a dark red. It feeds on oak leaves till *September*, and then turns to a brown Aurelia, which in *December* is changed to a brown nocturnal Butterfly, spotted with yellow and white.

Albin takes notice of several *oak* CATERPILLARS, one of which is yellow, with a black angular line running along the back. It changes to a beautiful nocturnal Butterfly, whose upper wings are of a gold colour, and the belly and lower wings of the colour of cream, clouded with gold and rose colours. Another is of a bright yellow, with reddish spots, and several points on the tail. It wraps itself up in the oak leaves, and in *September* turns to an Aurelia, which in *April* becomes a nocturnal Butterfly, with a back and upper wings of a pale green, and the inner side of the edges of a scarlet colour.

The same author speaks of another, which changes its skin twice; and then becomes of a bright brown, inclining to an ash-colour, and afterwards to a nocturnal Butterfly, variegated with white and black. Another oak Caterpillar is of a bright brown; another of a pale red, a third green, and a fourth yellow. This last is of an extraordinary shape, which in *June* becomes a Butterfly, whose surface is of a dark brown, and seems to be laid on a purplish blue.

Redi acquaints us, that on the twelfth of *July* an oak branch was brought to him, on whose leaves were above thirty Caterpillars, placed in a regular order. They were cloathed with white short hair, and their bodies were speckled with several colours, as yellow, orange, grey, and black. They had a yellowish crescent on the head, which was of a shining chestnut colour. They seemed to be all motionless, and were put into a large box, where in two days time they cast their skins, and began to eat oak leaves. They continued to feed till the twenty-second of the same month, when they retired to the corner of the box,
and

and became motionless again. They continued so two days, and then cast their skin a second time, after which they became lively, their bodies being larger, and their hairs longer. They fed very greedily till the first of *August*, when they left off, became weak and small, and their hair fell off. In short, they seemed extremely sick and weak, and continued so till the fourth of *August*, when six of them cast their skins a third time, became black Aurelias, and looked like children in swadling cloaths. The next day, in half an hour's time, they turned to Butterflies, but laid their eggs soon after, to the number of forty, which were of a pale blue, and had a little black speck in the middle.

The *honey-suckle* CATERPILLAR, in *August*, turns to an Aurelia, which does not change to a Butterfly till *June* the next year. There are other Caterpillars of this plant that become Flies.

The *dog grass* CATERPILLAR, in *July*, spins a green web, and turns to a grey Aurelia, from whence a Butterfly proceeds in *August*, of a dark orange-colour, that lays green eggs.

The *cabbage* CATERPILLAR does a great deal of mischief among those plants, in dry seasons, but it is killed by the rain. It casts its skin twice a year, and turns to a white Butterfly. It is of a pale green, spotted with black, and on the back there is a yellow spot or streak; but the belly is marked with small yellow specks. It turns to an Aurelia in *September*, and in *April* to the white common Butterfly.

When cabbages are young and tender, they are devoured by a Caterpillar of a meadow-green colour, with a yellow streak running along the back, and on both sides of each joint there is a small yellow speck. When it arrives at its full growth it turns to a pale brown Aurelia, spotted with black, and fourteen days after it changes to a small Butterfly. *Albin* speaks of a green cabbage Caterpillar, with a yellow line on each side, which he found on a cabbage-leaf in *June*, that turned to an Aurelia in *July*, and in the same month became the great common white Butterfly.

The

The *collyflower* breeds a yellow CATERPILLAR spotted with green and black, which devours the leaves, leaving nothing but the ribs. *Goedard* affirms, he has known some collyflower Caterpillars turn to very ugly Butterflies, and others to Flies. *Redi* gathered great numbers of the cabbage Butterflies, that were of a greenish colour, marked with white and black, and put them in boxes. In four days time they all became immoveable, after they were fixed to the top of the box. They left small yellow eggs behind them, which in *March* following turned to small blackish Flies. *Vallisnieri* discovered, that these were very small silken cods, made by minute insects that feed on the bodies of the Caterpillars. The above Caterpillars stick to the box by the means of a silken thread, which came from the extremities of their tails; there were also two other threads on their shoulders, and a fourth that proceeded from the under part of the mouth. They lay all the winter in this condition, but in *March* they left their skins sticking to the box, and came out in the form of Butterflies, of a blueish-green colour, with two black round spots on the upper wings, and two small yellow horns on the head.

The CATERPILLAR of the *citron-tree* is of a beautiful yellow, but red towards the belly; on the tail there is a double streak in the shape of a flame. Its thread is a kind of silk, more shining, and in greater abundance than that of Silk-worms; and if these Caterpillars were common, they would yield more silk than Silk-worms themselves. It becomes a very large nocturnal Butterfly, of a red and golden colour, with white streaks on all the wings, on each of which there is a bright transparent spot, that is surrounded by two circles, the one within, and the other without; one of which is white, and the other black.

Merian speaks of another insect that feeds upon citron-leaves, and is quite different from a Caterpillar; its feet are covered with a skin, with which it adheres thereto. This is a very venomous insect, for when it touches the skin, it certainly inflames it; however, it changes to a beautiful nocturnal Butterfly.

The leaves of the *hazel-tree* feed CATERPILLARS of different kinds, one of which is of a saffron-colour, and turns to a nocturnal white Butterfly, streaked and variegated with brown spots. *Ray* mentions the great hairy Caterpillar, with thick tufts of hair, or pencils of a red colour, that feeds upon the leaves of this tree. It is of a yellowish-green, and produces a small green Butterfly. *Albin* gives the figure of a monstrous Caterpillar, which, according to *Aldrovandus*, is of a middle nature, between a Caterpillar and a Spider. *Albin* has another beautiful Caterpillar, of a grey colour, variegated with black specks on the back. It retires into the ground before it turns to an Aurelia, and afterwards becomes a nocturnal Butterfly. Another turns to a nocturnal Butterfly with wings furrowed like a cockle-shell. There is also a green Caterpillar, which turns to a Butterfly, nearly of the same colour.

The CATERPILLAR *found on the leaves of garden-creffes* is black on the back, and white under the belly. It has six black feet before, and eighteen behind, that is, nine on each side. In *June* it spins a slender cod, and changes to a brown Aurelia, from whence a nocturnal Butterfly proceeds soon after, spotted with brown.

The *sea-green* CATERPILLAR feeds on the herb by some called the peacock's crest, and changes to a nocturnal Butterfly, of an ash-colour, that feeds on the honey of flowers.

The *dandelion* CATERPILLAR is of a brown colour, and has two sorts of hairy horns on its head; and on the back there are five small tufts of hairs, but all the rest of the body is covered with yellow hair. In *May* it produces a grey Butterfly.

The CATERPILLAR *of the sleeper*, a plant so called by the *French* in *America*, is green, striped with rose-colour, and has two small horns. It changes into a brown Butterfly, variegated with yellow.

The *eglantine* CATERPILLAR is very slow and idle, for it will sooner suffer itself to be crushed to pieces, than run away. It turns to an Aurelia in *September*, and in *May* following turns to a beautiful Butterfly.

There

There are several CATERPILLARS that feed on the *white thorn*, one of which has a gilded back, and changes into a Chrysalis, which becomes a Butterfly, with black veins. It is of the colour and shape of the large cabbage Butterfly. There is another spotted with white on the sides, and the furrows between the legs are black; but the rest of the body is of a brownish-black: this turns to a nocturnal brown Butterfly, marked with a lighter brown in the middle of the wings, and two white spots on the upper wings. There is a third black Caterpillar, with brown spots, and the rings of a saffron colour. It becomes an Aurelia in *May*, and in *August* a nocturnal Butterfly, of a bright grey colour. There are still several others, one of which is beautifully variegated with different colours, and becomes a nocturnal yellow Butterfly, with different spots. Another is brown, and the Butterfly it changes to is partly red, and partly yellow. A third is of a dusky colour, with a red head, and it turns to a nocturnal Butterfly of a bright yellow, with darker shades, and spots of the same. A fourth is of a sea-green colour, and the upper wings of the Butterfly are of a bright brown, and the lower of a bright yellow. A fifth is green, and turns to a nocturnal Butterfly, of a greenish blue. A sixth is of a blackish brown, and is metamorphosed to a white nocturnal Butterfly. A seventh is of a deep black, with spots of different colours, and the Butterfly is of a dirty grey; and a ninth is green, which turns to a nocturnal yellow Butterfly.

Goedard speaks of one that feeds upon the leaves of the white thorn, and hides itself under them, to avoid the heat of the sun. He had one of these that cast his skin three times; but on the twelfth of *June* turned to an Aurelia, which produced, on the fourth of *July*, a beautiful white Butterfly.

The *barberry-bush* CATERPILLAR is of a golden colour, with a black head, on which the Ichneumon Fly lays its eggs, which become worms, that feed on these sort of Caterpillars. There is another with a green back and yellow belly, from whence proceeds a brown Butterfly. There is yet another of a blackish brown, with red spots, which changes to a white

nocturnal Butterfly, whose upper wings are spotted with black.

The *maple* CATERPILLAR is of a dark brown, and turns to a beautiful yellow Butterfly.

The *fennel* CATERPILLAR is green, with streaks as black as velvet, and is spotted with orange; it has feelers of the same colour. It turns to a green Aurelia, and then to a beautiful Butterfly, of a yellow colour, variegated with black.

The CATERPILLAR of the *sweet bean plant of Surinam* is covered with black and yellow hair, and turns to a Fly, with brown wings, and the body is spotted with red, green, gold and silver colours. On the same plant there is a white Butterfly, armed with black points at the back, and the feet are likewise black. It afterwards turns to a beautiful Butterfly.

The *fig* CATERPILLAR is at first green, striped with yellow, and afterwards orange, with red streaks all over the body, but the head and tail are black. It turns to a brown nocturnal Butterfly.

There is also a large CATERPILLAR, mottled with various colours, that feeds on the leaves of the fig-tree, and has two orange-coloured horns, which are venomous, and cause sharp pain. It becomes a nocturnal Butterfly, variegated with dark brown, green, and silver colours. There is also a green Caterpillar belonging to this tree, striped with white, which changes to a nocturnal Butterfly, variegated with yellow, white, and grey.

The *rasberry-bush* CATERPILLAR becomes a brown Butterfly, whose wings have a whitish round spot in the middle.

The *ash-tree* CATERPILLAR rolls itself up under the leaves, to shelter itself from the heat of the sun. One of these was observed to be metamorphosed into an Aurelia on the twenty-fourth of *June*, and to become a sort of a Moth the twenty-sixth of *September*. The black Cray-fish is a Caterpillar, so called, belonging to this tree, because the hinder part, in some sense, resembles a Cray-fish; but the fore part is like a snail, and it is all over black. It turns to a grey Fly.

The *fern* CATERPILLAR is of a beautiful bright green, and changes to a nocturnal Butterfly, of a bright brown, whose upper wings are brown and white.

The CATERPILLAR of the *German broom* is green, with a black stripe running along the back, and under it, on each side, there is a white stripe. It spins a web in the middle of *June*, with meshes like a net, and at the beginning of *July* it changes to a small nocturnal Butterfly, of a bright green. The wings are marked with transverse white streaks, inclining to green, and it flies very swiftly. There is another Caterpillar belonging to this shrub, which is black, and on each joint there are two small blue spots, adorned with a tuft of hair. The head, and all the feet, are of an oker colour. At the end of *June* it spins a grey web, and turns to a brown Aurelia, with a head covered with black hair. In the middle of *July* it becomes a nocturnal Butterfly, of a dark yellow, streaked with brown, and the horns resemble feathers.

The *gum-gutta* CATERPILLAR is very large, and streaked with green and black; it feeds on the leaves of this plant, and becomes a stately Butterfly.

The *grass* CATERPILLAR is of a bright green, and on each side of the body before there are six small feet, eight in the middle, and two behind. It turns to a green Aurelia, from whence proceeds a small beautiful Butterfly, variegated with brown and black stripes and spots. It has two small horns, spotted with white and black, and two fine green eyes. It flies very swiftly. There are other Caterpillars belonging to the different sort of grass; one of which is of a bright brown, spotted with black and yellow. It sleeps by day, and by night is in continual motion.

Another is green, and changes to what is called the brown meadow Butterfly. Another again is yellow, with a brown head, and changes to a nocturnal Butterfly, called the Wood Leopard. On the grass of marshes there are two, one of which is of a dark red, and changes to a nocturnal Butterfly or Moth; and the other is green, changing to a nocturnal Butterfly, of a reddish colour.

Merian takes notice of a large brown Caterpillar, that feeds upon common grass, which is variegated with yellow and white, and has a small tuft of black hair on the head; on the tail there is a prickle resembling a small horn, and on each side there are small tufts of white hair that cover the legs. It delights in moist places, and in the middle of *June* spins a yellowish cod, from whence proceeds a nocturnal Butterfly or Moth, at the end of the month. It is of a faded yellow colour, and across each wing there is a brown streak, with two white spots, and a narrow border of brown. It lays white eggs.

The *grenadier* CATERPILLAR feeds upon a plant so called in *Surinam*. It is of a yellow, and in *May* turns to a fine Butterfly, of a blueish silver colour, bordered with a brown stripe, marked with white half-moons; but underneath it is brown, spotted with yellow. It appears through a microscope to be covered with blue tiles, like those that cover houses. The largest feathers are ranged in a beautiful order on the wing, and look like those of a peacock's tail, being very brilliant.

The CATERPILLAR of the *white gooseberry-bush* has a grey body, with a black stripe on the back. They are hairy, and the head is yellow. Behind the head, on each side, there are five blue specks, and others along the body that are red. In *August* they turn to a bright brown Aurelia, and from it in *September* there proceeds a nocturnal Butterfly or Moth, streaked with white, yellow, and black.

On the *common gooseberry-bush* there is a CATERPILLAR, yellowish on the fore part, and on the hinder white above, and yellow below. The Aurelia resembles a child in swaddling-cloaths, which shine with gold and silver. At the end of *June* it turns to a Butterfly, whose upper part is spotted with a deep yellow and brown, and the under adorned with black spots.

On the *prickly gooseberry-bush* there is a brown CATERPILLAR, in *April*, streaked with black, and spotted with white. In *June* it spins an oval cod, of a dark yellow, and turns to a brown Aurelia; and the

Moth

Moth that proceeds from it has a white spot on each wing. There is another green Caterpillar on the same plant, that sticks so close to the leaves, that it cannot be taken off without hurting it. In *May* it turns to a brown Aurelia, and fourteen days afterwards to a white and brown Butterfly, with several spots.

The *red gooseberry-bush* feeds a sort of grey CATERPILLAR, which in *December* changes to a chestnut-coloured Aurelia, and in *February* to a white Moth, streaked with black, that lays greenish eggs.

Albin mentions a whitish yellow CATERPILLAR, variegated with black and red spots, that hides itself in the ground, where it changes to a red Aurelia, and becomes a nocturnal black and white Butterfly, mixed with yellow. This Caterpillar has been found on the gooseberry-bush, and is called by *Ray* the middle-sized *Phalæna*, with large wings, marked with many black and white spots, and yellow, transverse, variegated lines.

Merian takes notice of the CATERPILLAR that feeds on the red gooseberry-bush, which differs from others, in not having the feet in the middle of the body, but at the extremity. It changes to an Aurelia the first of *April*, and turns to a fine Butterfly the latter end of *June*; but it is too weak to live long. *Goedard* says he has met with one that turns to a grey Fly, and lives but four days; and there is another that becomes a black and yellow Fly.

Goedard has observed another on this bush that feeds on small insects, that run about its body; it turned to an Aurelia the ninth of *June*, and on the thirtieth it became a Fly.

The *guava* CATERPILLAR of *Surinam* is green, with six white streaks on each side, and a black round spot on each joint. On the hinder part it had a red horn, and became a nocturnal Butterfly, with ash-coloured wings, marbled with white and black. The body was marked with ten orange-coloured spots, and on the head there was a long red trunk, which it made use of for the sucking of flowers. There are other Caterpillars on the same tree, that are covered with hair, on some white, and on others red. They

are all venomous, and when touched, cause a swelling, with pain. They have four feet, and turn to ugly small Flies.

He also mentions another sort, with a black head and back, that turn white by little and little, and afterwards become of a fine yellow. The fore and hind parts are covered with black hair; but that under the belly is brown. It becomes a nocturnal Butterfly, with a white body, spotted with a yellowish brown.

He likewise takes notice of *a large dark brown* CATERPILLAR, with a black streak from the head to the tail, and black rings round the body. On the belly there are small white specks, and the head and tail are of a purple colour. It becomes a large nocturnal Butterfly, with a white streak on its body, and four black spots on each side, besides four black oblique lines, and four others that are white. The upper wings are spotted with white and brown, and the lower are yellow above, and dark brown below.

The *purple* CATERPILLAR feeds on all sorts of herbs, but more particularly pinks. They are of a brownish-purple above, and of a bright yellow below; in *August* they change to Aurelias, and fourteen days after to Moths. The black Caterpillar feeds on all sorts of herbs and leaves, and rolls itself up when touched; it turns to a Butterfly, spotted with black in three different places.

The *hop* CATERPILLAR has half the back and belly of a tawny colour, and the other half white. It turns to an Aurelia in *August*, and, towards the end of the same month, becomes a dark red Butterfly. Ray calls it the Butterfly like that of the Elm, but less, with lacinated wings, and the lowermost marked with a crooked black line.

The *byssop* CATERPILLAR is found on that plant when it is in flower. When a leaf is touched, it throws itself down, and gets into the earth. It changes its form in *August*, and three days after there proceeds from the skin three small worms, which change in a short time to eggs, and then to Flies in *September*; but they live only three days.

The *knap-weed* CATERPILLAR is found on the flowers of this plant, and is of a brown colour, and hairy. It spins itself a cocoon, which turns black, and in *March* following changes to a white Moth, streaked and spotted with black. *Albin* acquaints us, that there is another Caterpillar, which feeds on the leaves, that turns to a Moth, of a deep brown colour, with a mixture of dirty grey on the wings.

The CATERPILLAR of the *oriental hyacinth* is black, hairy, and very nimble; but when touched, it rolls itself up. It spins a cocoon, which turns to a black *Aurelia*, and fourteen days after to a Moth, with brown upper wings, and the lower of a pale red, spotted with black. It is found in *Surinam*.

The *rag-wort* CATERPILLAR is of two kinds, the first of which is of a citron colour, with black wings, and changes to a red and black Moth. Small worms proceed from its body, which turn to *Ichneumon* Flies. The other is an Autumnal Caterpillar, like the former, but how it changes is not known.

The *Java* CATERPILLAR is large and white, streaked with black. On each side there are five shining specks, of a red colour, which some take to be eyes. It turns to a Moth, striped with black and white. There is another green Caterpillar, that feeds on the same leaves, and becomes a transparent Butterfly, spotted with black.

The *crowned* CATERPILLAR feeds on the leaves of the *Indian jessamin*, and becomes a fine undulated Butterfly, with six white spots on the wings, whose under parts are red and black. There is a Caterpillar on the common jessamin, of a green colour, with red stripes, but they are very uncommon, as *Albin* acquaints us.

The CATERPILLAR of the *sea bull-rush* is a very slow insect; on the second of *June* there was a worm observed to proceed from the hinder part of its body, which on the twelfth became a very small Fly. This Caterpillar turned to an *Aurelia* the fifth of *June*, and on the first of *August* became a Fly, with wings so close to its body, they could scarcely be seen.

The CATERPILLAR of the garden iris, with large leaves, is green, and very swift; it changes to an Aurelia in October, and in March following to a brown Moth, with a white spot on each wing. There are also blueish Caterpillars on this plant, which in September turn to bright coloured Moths. Merian affirms, he has found a green Caterpillar at the roots of the iris, which in June turns to a grey Moth.

The CATERPILLAR of the dame violets is a long slender insect, which, when it creeps, turns up its tail near the head. It changes in May to a grey Aurelia, which in June becomes a fine Butterfly, with the head, lower wings, horns, and feet, of a bright yellow, and the eyes black. Merian mentions a green Butterfly, of the same plant, with a black head, and six feet before, six in the middle, and two behind. At the end of April it spins a yellow web, which turns to a green Aurelia, spotted with black, from whence a white Butterfly proceeds in May, that can scarce fly from one flower to another.

The CATERPILLAR of the sow thistle has the upper part of the body grey, and is striped with brown, and spotted with white; but underneath it is of a flesh-colour. It turns to a bright brown Aurelia in July, and the next June becomes a yellowish Moth, variegated with green and black.

The lettuce CATERPILLAR is brown and green under the belly, with six feet before, eight in the middle, and two behind. Towards the end of August it turns to a brown Aurelia, with black eyes, and the body variegated with black. A grey Caterpillar feeds on the cabbage-lettuce, and on its back there is a dark yellow streak. It turns to a brown Aurelia in August, and to a Moth in September, with the upper wings brown, and the lower blueish, as well as the body. A venomous hairy Caterpillar belongs to the same plant, which the birds will not meddle with, and which turns to a large handsome Butterfly, spotted with fine red. Godard mentions another that is green, which turns to a grey Butterfly with a long trunk.

The white archangel breeds a green CATERPILLAR, streaked with white lines, which turns to a Moth, whose

whose upper wings have a dark ground, and part of them shining like burnished copper; the lower are of a dirty white.

The CATERPILLAR *of dog's tongue*, a weed so called, is streaked with black and yellow, and the wings are marked with different colours. It enters the earth in *May*, where it changes to an Aurelia, that produces a very fine Moth, with the back and upper wings of a bright green, spotted with white and saffron colour. The upper part of the belly is red, with a black streak, and the lower wings are also red, spotted with black.

The CATERPILLAR *of the lavas*, a herb so called, is named by *Goedard* the Centinel, because it continues in the same posture for some time, and seems to be looking about. In *June* it turns to a brownish-grey Butterfly.

The *ground-ivy* CATERPILLAR is green, and when touched rolls itself up. It turns to an Aurelia in *July*, and in *August* to a Moth, whose upper wings are of a wood colour, and the lower striped with green. There is another that feeds on this herb, which turns to a fine Butterfly in *May*, of a shining gold colour, and on its head there are two fine tufts like feathers.

The CATERPILLAR *of the blue lilac* is green, and in *May* spins a white cocoon, which turns to a bright Aurelia, and before the end of the month changes to a bright brown Moth. There is another green Caterpillar belonging to the same tree, which in *October* turns to a Moth striped with green and white.

The CATERPILLAR *of the lemon tree* is brown, with a white spot. This species lie in heaps on the leaves of that tree. On the head there is a yellow horn, which is their defence, and in *April* they turn to blackish Butterflies, spotted with white and red.

The *flax* CATERPILLAR is of a greenish brown, and under the belly of a bright green, with a black streak on each side. It turns to an Aurelia in *August*, and in *May* following to a greyish ash-coloured Moth, with wings variegated with black, and black eyes.

The CATERPILLAR of the orange flower-de-luce has the upper part of the body brown, streaked with a darker colour, and it is yellow underneath. In *June* it turns to an Aurelia, and in *August* to a Moth, variegated with light and dark brown. There is another Caterpillar on the same plant, that turns to a sky-blue Butterfly with violet wings, and four golden spots on the back.

The CATERPILLAR of the red flower-de-luce is bred in *Surinam*, and covered with black hairs as hard as iron. The head and feet are red, and the body is full of blue spots, surrounded with a yellow circle. It turns to a fine Moth, whose wings before are of a bright brown, and behind of an orange-colour, spotted with black.

The scammony CATERPILLAR is large, and of a shining green colour. It turns to a bright Aurelia, and in *August* to a small Moth, of a greyish ash-colour, variegated with dark brown. *Merian* speaks of another of a bright green, that turns to a rose-coloured Aurelia, and fourteen days after to a small flying insect.

The CATERPILLAR of the maure, so called by the *French*, is small and green, with white streaks; it first changes to an Aurelia, and the day after to a small Butterfly. There is another larger, that feeds on the flowers, and in *August* turns to a whitish Butterfly. There are Caterpillars that feed on the leaves of wild maure, that turn to brown Aurelias, and the next *May* to small Moths.

The feverfew CATERPILLAR is brown, and turns to a brown Moth.

The CATERPILLAR of the brown mellilot is bred in *Surinam*, is large, and of a bright green, with brown spots. It has six feet before, eight intermediate feet, and two behind, and on each ring of the lower part of the body, there is a blood-coloured spot. It spins a white web, and turns to an Aurelia of a bright violet-colour, from whence in *June* proceeds a Moth, with the head, body, horns, and upper wings grey, and variegated with black and white specks and streaks; but the lower wings are of a fine vermillion colour.

The CATERPILLAR of the *water melon* is blue before and behind, and green in the middle. The feet are covered with a slime like a snail, and in *August* it turns to an ugly Moth.

The CATERPILLAR of *garden mint* is white, streaked with green, and spins a fine web, or cocoon, which turns to a brown *Aurelia*, and in *August* to a Moth, that shines like gold. There is another of a yellow colour, that changes to a Moth of a rose colour, which quickly dies. *Albin* mentions a green Caterpillar that feeds upon mint, and turns to a Moth, marked with the letter Y on the middle of each upper wing.

The CATERPILLAR that feeds on *French mercury*, and falls to the ground as dead, when the leaves are stirred, in *August* turns to a Butterfly that has a sort of a small mantle spread on its wings, which covers all the fore part of this insect, and serves both for an ornament, and for defence.

The *night-shade* CATERPILLAR is green, and turns to a light brown Butterfly, that flies very swiftly. *Albin* has two belonging to this herb, one of which is of a yellowish green, spotted with a bright yellow, the other of a dark grey, spotted in the same manner, and has a line of a saffron colour. They both turn to Moths, of a reddish brown.

The CATERPILLAR of the *mulberry-tree* has been largely described under the name of the Silk-worm.

The CATERPILLAR of the *musk plant* is green, streaked with black, and turns to a white Moth.

The CATERPILLAR of the *myrtle tree* has a brown head, adorned with four red spots, and a double black whisker; the body is brown, variegated with small red and yellow streaks, and one large black streak along the back, on which there are four tufts of yellow hair, and a black tuft on the hinder ring, which is yellow on the top. The fore and middle legs are yellow, and the pair behind black. It turns to a small Moth. *Merian* says he has kept some of them in a box, which changed to vile small flying insects, with a black head and body, and legs of a dark yellow. Others, which are caught in *Friesland*, turned

to Flies, and others again to small yellow Moths. There was likewise another black Caterpillar, with a tuft of yellow hair on each ring, and on each side of them a small white speck. It turned to a white Moth, adorned with shining black and brown specks and spots.

The *medlar* CATERPILLAR is yellow, streaked with rose colour, and the head brown. Each ring is armed with four black prickles, and the legs are likewise of a rose colour. It turns to a beautiful Butterfly, of a brownish silver colour, across which there are shining blue, green, and purple streaks. On each wing there are three round spots, of an orange colour, bordered with a black circle, and this surrounded with one that is green. The extremity of the wings is also of an orange yellow, with black and white streaks.

The *pink* CATERPILLAR feeds on the flowers of that name, and hides itself in the ground in the day-time. In *July* it turns to an Aurelia, and in *September* to a Butterfly, before taken notice of.

The CATERPILLAR *of the orange tree* has a yellow streak on the body, and each ring has four specks of an orange-colour, surrounded with very fine hair. It becomes a Moth, with a spot on each wing, that resembles talc.

The CATERPILLAR *of the bear's ear* produces a green worm, that sucks its body dry. This worm afterwards changes to an Aurelia, which becomes an Ichneumon Fly.

The *elm* CATERPILLAR spins a small web or cocoon, and at the end of nine months turns to a Fly. Some call it the Grasshopper Caterpillar, because it leaps from one place to another.

There are several CATERPILLARS that feed on elm leaves; one of which, taken notice of by *Albin*, is of a bright green, inclining to blue, with white lines, and the lower part marked with black specks, but the head is red. It retires into the ground, where it becomes an Aurelia, that changes to a bright brown Moth. There is another of an olive colour, adorned with red and yellow spots round its wings, which turns to a black and white Moth. There is still another, which

which is very beautiful, inclining to blue, and marked with yellow specks. It turns to a Butterfly, called the great tortoise shell Butterfly.

Goedard affirms, there is a CATERPILLAR on the leaves of the elm tree, that fixes itself thereon with a thread, in such a manner, that it bends the two extremities of the leaf, closing them together with its web, and leaving an opening before and behind. When it is touched never so slightly, it falls down, holding itself by a thread, and moves about as swift as an eel. There are two sorts, one of which becomes a Butterfly, and the other, which is larger, produces worms that have killed the Caterpillar. These are thirty-two in number, and lay each an egg, which turns to a small Fly.

The same author takes notice of another, which wraps itself up in a dry leaf, falls to the ground, and covers it with a web, that shines like silver. It turns to a Fly.

Goedard has still another, which produces a Fly that is able to kill Spiders, though all other Flies become their prey, and seems to take pleasure in it. It will break off all the legs, and then drag it along, carrying it off.

There is still another, mentioned by the same author, that feeds on elm leaves, and before it turns to an *Aurelia* gets into stables and houses among boards. It hangs with its head downwards, and seems to be a round ball when the skin begins to crack. It turns to a beautiful Butterfly.

The CATERPILLAR of the large stinking nettle is black, and turns to a yellow *Aurelia*, from whence proceeds a Butterfly, brown without, and within of a dark orange, variegated with a mixture of black and purple. There are others of a bright green, and others brown; but they are all adorned with white and black streaks, and many of them spin a white web. They at length change into blue Flies with red heads; though there are some that in *February* are metamorphosed to grey and brown Moths, variegated with black and white.

Albin speaks of several CATERPILLARS that feed upon nettles, one of which is black, and has the upper part marked with white specks, and covered with hair. Another sort is also covered with hair, and is of a yellow colour, but spotted. It turns to a Butterfly, called by *Ray* the greater blackish Butterfly, with wings beautifully adorned with red and white spots. Some call it the Admiral. Another Butterfly fed by nettles, is called the Butterfly like the eye of a peacock's wing, and is named by *Moufet* the *queen of Butterflies*. The Caterpillar it proceeds from, is called by *Ray* the greater black Caterpillar, sprinkled with white spots, and beset with black prickles.

There is another produced by the CATERPILLAR of the nettle, termed by *Ray* the lesser Phalæma, with oblong wings, variegated with white and blue, and yellowish at the roots. There is yet another, called by *Ray* the greater Butterfly with large wings, the upper being brown, and beautifully variegated with white and red spots and lines.

Lister takes notice of another that never feeds in the day time, for fear it should be devoured by birds, which produces a Moth, with saffron-coloured wings, adorned with black streaks, and two black spots; as also red spots on the upper wings.

The *forrel* CATERPILLAR is hairy, black, and spotted with white and red. It produces a Moth, with the body and lower wings yellow; and the head, upper wings, small horns, and feet brown, spotted with black.

The CATERPILLAR of *the palisade*, a plant so called in *Surinam*, is yellow, streaked with black, and armed with six prickles. The first changes its skin to one of an orange-colour, with a black round spot, but still retains its prickles; some days after it casts its skin again, losing the prickles, and in *June* it becomes a Moth.

The CATERPILLAR of *palma christi*, a plant so called, is of a greenish colour, covered with long white hair. It turns to a black Butterfly, whose upper wings are of the colour of brimstone, and the other of saffron. The same plant breeds another Caterpillar,
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of a black colour, spotted with yellow, that is shut up in a case of dry leaves. It changes to an ugly Moth, which is very troublesome.

The CATERPILLAR of the *palm of the downs*, an herb so called in the low countries, has two tails, and when it is angered, it shoots from each a red sting. In *September* it begins to turn to an Aurelia, and continues in that state till the next *June*; and then there come out five small Flies, out of five distinct cells, which, when opened, have no appearance of the skin, or any part of the Aurelia.

The CATERPILLAR of the *palm-tree* is red, spotted with brown. They spin a sort of bags on the palm-tree leaves, in which they lodge in the night, going out to feed in the day. They turn to yellow Butterflies spotted with brown, and are bred in *Surinam*. There is another little hairy brown Caterpillar bred upon this tree, that turns to a transparent Butterfly, spotted with black.

The CATERPILLAR of the *papaw-tree* is yellow and green, and becomes a Moth, that buzzes with its wings. There is another of the colour of raddle, streaked from the head to the tail with red and yellow; and on the head there is a buckler, of a semicircular form, which shines like a diamond. It turns to a buzzing Moth, mottled with iron grey and white, and the body is streaked on each side with bright red, and on the back with black.

The CATERPILLAR of the *passion flower* turns to a small Butterfly, and there is another that changes to a red and brown insect; besides a third, that is metamorphosed to a spotted Fly, furnished with delicate cloven feet.

The *dock* CATERPILLAR is of a deep yellow, with dark brown streaks, placed in the form of a cross. In *May* it turns to a brown Aurelia, and in *June* to a Moth, streaked with white and brown. *Merian* fed a Caterpillar with this plant, that was at first streaked with dark green, which by little and little turned to a yellow, and then brown. It changed in *May* to a small Aurelia, of a bright brown, whose upper part resembled the head of a bird. Fourteen days afterwards

wards it became a small Moth, with red eyes, and a red streak on every wing, round which there was a red border.

The *poppy* CATERPILLAR is black and yellow, from whence a Moth proceeds in *June*. The same plant feeds worms, that afterwards become Flies.

The CATERPILLAR *of the peach tree* has a head and back of a bright brown, and turns to an Aurelia, which becomes a Moth, on whose upper wings there are white lines.

The CATERPILLAR *of the poplar tree* has a brown back, and a pale-red belly; it becomes a beautiful Moth, of a dark brown, streaked with white. *Goedard* takes notice of another that is white, which turns to a beautiful white Butterfly.

The CATERPILLAR *of the lark's foot*, an herb so called, is of a curious colour, variegated with streaks and spots; in *July* it changes to a brown Aurelia, and in *May* following to a rose-coloured Moth, adorned with black and white. The flowers feed a green and white Caterpillar, which turns to a brown Moth.

The *plantain* CATERPILLAR is green, but turns to a brown Aurelia, and in *December* becomes a brown Moth. On the small plantain feeds a bright green Caterpillar, striped with white the length of the body, and each ring adorned with a white spot; at the end of *July* it becomes a brown Aurelia, and in *August* a Moth, with the upper wings white, and the lower grey; but the eyes are black, as well as the horns.

The CATERPILLAR *of the pear tree* has a blackish body furnished with yellowish tufts, and on the fore part of the body there are three claws, in the middle eight feet, of an oker colour, and behind two more of the same colour. It changes its skin several times, after which it spins a white web, and turns to a brown Aurelia, and fourteen days afterwards it becomes a beautiful bright brown Butterfly, streaked and spotted with divers colours. On the same tree there is a white Caterpillar with a black head, which goes out of its cell in a morning to feed, and then returns back; when it is full grown, it spins a white web, that
turns

turns to an Aurelia, and then becomes a Moth, which lays its eggs and dies. There is another white Caterpillar, when this tree is in blossom, with red spots on the back, and a brown head. In the middle of *July* it turns to an Aurelia, and at the end of that month to a white Moth, variegated with black. The lower wings are of a bright brown, and the body of a flesh colour, with little white horns, covered with brown hair; the eyes are black.

The CATERPILLAR of *Indian-pepper* is a handsome large insect, with a long red streak on each side, and a white one on the neck. The last ring is armed with a rose-coloured horn, and on some other rings there is a yellow spot, bordered with rose-colour. It turns to an ash-coloured Moth, on each side of which there are five gold-coloured spots.

The CATERPILLAR of *the apple tree* is brown, and turns to a brown Moth. Another on the same tree changes to a grey Moth; and a third, which is greenish, is metamorphosed to a Moth. Another author affirms there is a fourth, of a brownish colour, with red and blue specks on each ring. It weaves itself a cod, and turns to a brown Aurelia, which changes to a white Moth, streaked with brown. When it has laid its eggs, it covers them with a yellowish down, which keeps them safe from the cold of the winter.

Merian found upon an apple tree in blossom a yellow hairy Caterpillar, adorned with transverse streaks, and the head was brown; behind the head there were two blue spots, and on each ring spots of a flesh colour. The feet were of the same colour, and it was furnished with small tufts of brown hair. In *July* it spun a yellow web, with meshes like a net; and the Aurelia became a white Moth, variegated with black; it had two broad red horns, resembling feathers, and on the hinder part of the head there was a red streak.

The CATERPILLAR of *the pompelmous*, a tree so called in *Surinam*, is white, with a blue head, and the body is covered with long hair as hard as iron-wire. It turns to a beautiful black Butterfly, variegated with green, blue, and white, shining like gold and silver.

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The CATERPILLAR of the *plumb tree* is green, spotted with black, and has a black head. When it is touched it descends to the ground, by means of a thread drawn from its mouth, by the help of which it gets up again. It is concealed in a leaf, rolled up, and in due time spins itself a cod, which turns to a bright brown Moth, with the back part and under sides of the wings white.

Tha CATERPILLAR of the *damaſcene plumb* is green, streaked with black, speckled with yellow. It weaves itself an oval cod, that shines like silver, and is as stiff as parchment. It turns to a brown Aurelia, which becomes a Moth, whose lower wings are streaked with brown and yellow. There is likewise another Caterpillar belonging to the *plumb tree*, which is of a beautiful yellow, adorned with several tufts in the shape of rods, on the back, and on the tail there is a red spot. When it stretches itself out, four hairy black streaks may be perceived, that run across the body. Some of these turn to grey Moths in *September*, and others do not change till the next *April*; but the Moths are the same.

The CATERPILLAR of the *wild plumb tree* is brown, and adorned with white streaks. It changes to a Moth of a dull yellow colour, with white wings and feet, and black eyes. It covers its eggs with down, to preserve them from the snow, rain, and cold. There is another that is black, streaked with yellow, and has a shining body; it turns to a white and yellow Butterfly, with wings adorned with black streaks, but the eyes and feet are black.

Albin speaks of one that is of a sea-green, which turns to a Butterfly, called the hair streaked Butterfly. He likewise mentions a black Caterpillar, spotted with brown the whole length of the back, and streaked with yellow. It turns to a Moth, with the back and upper wings brown. There is likewise another beautiful black Caterpillar, with yellow hair, which *Ray* calls the large Caterpillar, with long, thickset, hoary hair, variegated with dun and black, and having whitish lines on the rings. It turns to a large Moth, of a whitish and dun colour, with ample oblong wings,

wings, beautifully variegated, the lowermost of which are reddish, with black spots.

Albin describes six more, which are,

The *bright green* CATERPILLAR, which changes to a Moth, with reddish brown wings.

The *bright olive coloured* CATERPILLAR, that is metamorphosed to a bright yellow Moth.

The CATERPILLAR *of the colour of an oxier branch*, which turns to a saffron-coloured Moth.

The *bunch-backed* CATERPILLAR, that turns to a white Moth, streaked with black.

The *green* CATERPILLAR, which becomes a Moth, with the upper wings partly yellow, and partly white, and the lower of a chestnut-colour.

The *dark grey* CATERPILLAR, *with yellow spots*, changes to a Moth, whose females have no wings.

Goedard describes one that has four yellow tufts like brushes on its back, and two horns on the head like a snail; on each side there are two prominences, like oars, one of which is yellow, and the other black; and there is likewise a tuft of hair on the extremity of the body. It changes to a sort of insect, that is neither a worm nor a Butterfly.

Redi speaks of a CATERPILLAR of an orange colour, so large, that it weighed three quarters of an ounce. It was composed of thirteen rings, between each of which were several small eminences, of an azure colour, with two white spots on each, surrounded with a black line. It spun itself a large cod of the colour of moss, which looked more like hair-cloth than any thing else. It became a very large Butterfly, near the latter end of *April*.

The CATERPILLAR *of the American white grape tree* is very voracious, and becomes a beautiful green and red Moth, with streaks of a colour, inclinable to chestnut; but the horns and trunk are of the colour of gold. There is another belonging to the same tree, that draws itself up when touched, and throws out a froth; it turns to a beautiful Moth, spotted with brown, and streaked with white, and the trunk is of a gold colour.

The CATERPILLAR of the *ranunculus* has an orange coloured back, and a pale yellow belly; but the other parts are black, and a little hairy. In *May* it makes a cod, which turns to an Aurelia, that hangs on a leaf, and fourteen days after it becomes a beautiful Moth, with the body, head, and upper wings black, spotted with red. A few days after it lays eggs and dies.

The CATERPILLAR of the *meadow ranunculus* turns to a black Aurelia, and then to a fine Butterfly, with the upper wings of a bright yellow, speckled with black, and the lower orange, with black streaks.

The *knot-grass* CATERPILLAR is brown and grey under the belly; in *July* it turns to a bright brown Aurelia, and in *August* to a grey Moth, streaked with black. There is another that is green, with three yellow streaks along the body, and several black spots; but what it turns to is not said. There is also a third, that is yellow, streaked with brown, which in *September* turns to a white Moth, adorned with red and brown streaks.

The CATERPILLAR of the *rocu*, an *American* tree, is brown, streaked with yellow, and covered with red hair; it becomes a brownish green Moth.

The CATERPILLAR of the *briar* is of several sorts, which are as follow. The greenish brown Caterpillar, which turns to a beautiful Butterfly, variegated with green and brown. The green Caterpillar, with a blue head, changes to a very beautiful Moth, variegated with divers colours. The green Caterpillar becomes a Moth, with the upper wings green, and the lower grey. The hairy Caterpillar is brown and red, and changes to a Moth, called by the *English* peasants the Devil's Gold Ring. The green and yellow Caterpillar is metamorphosed to a Moth, variegated with white and black. The ash-coloured Caterpillar turns to a straw-coloured Moth.

The CATERPILLAR of the *rocket* was put into a glass vessel, and was observed every night to change its colours successively, it being first of the colour of gold, then blue, afterwards black, and last of all purple; they were all undulated when the insect crept along.

along. It had two teeth made like sickles, and the rings of its body were supported on each side with crooked feet. Each ring was covered with hair, which was long in the last, and in the form of prickles. It turned to an Aurelia, of the size of a walnut, of a greenish colour, and pointed at the ends, in which state it continued a month, and then became a Butterfly of the largest and most beautiful kind. The extremities of the wings were turned upwards like a hook, and the edges were fringed, and of various colours; likewise the wings were spotted with black, red, and blue, which looked like eyes, as fine as those in a peacock's tail.

The CATERPILLAR *of the rose bush* is of different kinds, some of which turn to Moths, others to Flies. Those that are half green, and half rose coloured, become little brown Butterflies. The bright green Caterpillars, with white streaks along the body, has each ring marked with a white streak above, and a yellow streak beneath; but what it turns to, is not said; but there is another, which had six feet before, eight in the middle, and two behind; that turns to a brown Aurelia, and in *July* to a bright brown Moth, whose lower wings shine like gold.

Albin observes, that of the CATERPILLARS of the *wild rose tree*, some are brown, and others green, with a red head; they turn to Moths of a brownish black colour. On a branch of the dog rose, there was a flesh coloured Caterpillar, with a hump back, that turned to a flesh coloured Moth. There was also another that was green, with a white line on the back, that turned to a Fly, called the black headed Bee Fly.

Merian took notice of a green CATERPILLAR that fed on the rose bush, with a black head. When it was touched, it let itself down by a thread, and got up again by the same. In *May* it turned to an Aurelia, and fourteen days after to a small Butterfly, that shone like gold.

The CATERPILLAR *that feeds upon rue* is green, and variegated with red, yellow, and blue spots; and changes to a yellow Butterfly, streaked and enamelled

annelled with black, as well on the body as wings. On the extremity of the lower wings there are two round red spots, and others that are blue, terminated by a hairy violet line. At the extremity of the edge there are two small appendages, which look like tails to the wings, and on the head are two horns or feelers, which are long, blackish, moveable, and thicker at the extremity, than at the root. It dies in four days time.

The CATERPILLAR *of the willow* is large, and turns to a grey Moth. The black water willow feeds a Butterfly with small specks, which turns to a grey Moth, that lays green eggs. Another willow Caterpillar turns to a grey and red Butterfly, and a third is armed with horns, and changes in *July* to an Aurelia, which becomes a Moth in the *April* following. A fourth is metamorphosed to a flying insect, and a fifth, which is half yellow and half green, becomes a yellow Fly.

Merian mentions a very beautiful green CATERPILLAR, speckled with white, and a white streak running across each ring. It turns to an Aurelia, and the next *May* to a Moth, with head, body, and upper wings brown and white, variegated with yellow and black; but on the lower wings there are two large black eyes in the middle, surrounded with a blue circle. The upper part is of a bright brown, and the lower of a rose colour. It has small black eyes, and little horns.

He takes notice of another that is small, and of a bright green, adorned with white streaks, which turns to a brown Aurelia, and fourteen days after to a small Moth, of a greyish ash-colour, adorned with white streaks.

The CATERPILLAR *of the red willow* is green, and turns to a dark brown Aurelia, which in *August* changes to a bright brown Moth, with wings streaked with brown. The same tree breeds another of a small sort, that turns to an Aurelia, and then to a Fly, whose body, head, and horns are black, with two wings transparent, and six yellow feet.

Albin speaks of several sorts of CATERPILLARS found upon the different kinds of willows, which are as follow. The green and yellow Caterpillar, called by *Ray* the most beautiful double-tailed Caterpillar, and which turns to a Moth, that the same author terms the great and most beautiful Moth, with large external ash coloured wings, elegantly variegated with black spots and lines. The beautiful green Caterpillar, whose Moth *Ray* names the middle sized domestick Moth, because in *July*, *August*, and *September*, it comes into houses. The olive coloured Caterpillar, which turns to a yellow Butterfly, with wings variegated with black. The flesh coloured Caterpillar, that becomes a bright yellow Moth, with shades and spots of a darker colour. The green and red Caterpillar, from whose two extremities a Fly proceeds. The yellow Caterpillar that turns to a Beetle. The dark brown Caterpillar that changes to a Moth, with the upper wings yellow, and the lower of a yellowish white. The ruddy Caterpillar that turns to a Moth, called by some the Moth with red lower wings. The purple Caterpillar, with red and yellow spots, changes to a white Moth, streaked with black. The green Caterpillar with small red lines on the back becomes a white Moth, streaked with black.

Goedard takes notice of a CATERPILLAR of a bright yellow, variegated with a little black, which bears something on its head like an escutcheon, gules, with a cheveron of gold. It turns to an *Aurelia* in *August*, and in the same month of the following year becomes a strong vigorous Butterfly, and yet lives but two days.

The CATERPILLAR of *thyme* has the back marked with longitudinal streaks of different colours, that is, blue, purple, yellow, red and black; besides which there are many small specks. It turns to an *Aurelia*, like a Silk-worm, from whence four Flies proceed, which are probably the eggs of the *Ichneumon* Fly. They are larger than common Flies, with blueish heads and wings; but every where else of a purple colour.

The *nightshade* CATERPILLAR turns to a red Aurelia at first, which by degrees becomes black, and is transformed to a large Butterfly, which makes a noise with its wings like a Bat. It is of a yellow colour, variegated with black on the wings, back, and belly. On the head, which is black, there are two tufts, of a little lighter colour; but the eyes are of a chestnut colour, and the trunk black and curled. The six feet are hairy and yellow, and each of them terminate in a hook. What this changes to, *Redi* gives no account.

The *marygold* CATERPILLAR is of a dark colour, with black lines, and the belly of a bright green, with a white line that parts the dark colour from the green; it retires into the ground, where it turns to an Aurelia, and then changes to a dusky Moth, marked with a white spot on each upper wing. There is another breeds upon this plant, with a black back, and the head and the belly of a dirty green, with red spots like eyes. The Moth that proceeds from it has two round spots upon each upper wing, surrounded with a white circle, and there is a white streak on their extremity.

The CATERPILLAR of the *elder tree* is of a bright yellow, with two black streaks that run across the back, and three others that run longways behind. It has black teeth, and changes to a bright brown Aurelia, which becomes a white Moth, streaked with brown. There is also a green Caterpillar belonging to this tree, which becomes a bright brown Moth.

The CATERPILLAR of the *sycamore tree* is yellow, and covered with saffron coloured hair. When disturbed, it draws itself up like a hedge-hog; it changes to a grey Moth.

The CATERPILLAR of the *tabruba*, a *Surinam tree*, is yellow and black, and covered with hair, like a brush; it becomes a sort of Bee, streaked transversely with yellow and black.

The CATERPILLAR of the *lime tree* is a very large and beautiful insect, of the colour of silk, spotted on the back with white; but the lower part of the body is of a deep yellow. On the hinder ring there is a

blue

blue horn, and behind that a yellow spot. It turns to a black Aurelia, and seems to be dead till *May* in the following year, and then changes to a pale yellow Moth, spotted with black.

The CATERPILLAR of *turnsole* hides itself in the ground all day, and in the evening comes out to feed. It turns to an Aurelia in *May*, and in *June*, the year following, becomes a Butterfly, with the letter O on its wings.

The *trefoil* CATERPILLAR is red and yellow, and turns to a whitish Moth.

The CATERPILLAR of the *aspen tree* is of a golden yellow, and changes to an ash coloured Moth, with the extremity of the upper wings of a copper colour.

The CATERPILLAR of the *purple tulip*, tho' mentioned by *Merian*, is not described; but it turns to a Moth, whose upper wings are reddish, and the lower, with the rest of the body grey.

The *valerian* CATERPILLAR is of several kinds, some of which become grey Moths, and others brown Butterflies.

The CATERPILLAR of the *wine* is of two kinds, the one being brown, and the other green; they are both streaked and spotted with black and white. That which is brown, changes in *July* to a bright brown Aurelia, and continues in this state till the next *May*, when it becomes a beautiful Moth, with the head, body, and upper wings of a rose colour, variegated with green streaks and spots. The lower wings have each a black spot, and the eyes are of a yellowish green. It has a long slender yellow trunk, curled at the end. It is one of the most beautiful and remarkable of this kind.

Albin mentions an *olive coloured* CATERPILLAR, that feeds upon the leaves of the vine, and becomes a grey mottled Moth, with two white spots on the upper wings.

The CATERPILLAR of the *wine of Surinam* is brown, spotted with white, and there is a black spot on the last ring, in the middle of which is a white

skin, that shines like crystal, and rises and falls when this insect breathes. It becomes a beautiful green Moth, with the ends of the wings painted with red and blue.

Goedard takes notice of one that feeds on the vine, which he calls the Elephant Caterpillar, it having a trunk like that animal, but what it turns to is not known.

The *violet* CATERPILLAR is of a dark brown, with a white streak on each side the body, and the head and fore feet yellow. It turns to an Aurelia in *August*, and the next *April* to a Moth, with the head, body, and wings variegated with a bright yellow; as also with black spots. The eyes are black, and the horns and legs are of the same colour. There is another of a pale green, spotted with yellow, which in *June* turns to a greenish Aurelia, and soon after to a white Moth, variegated with grey spots; likewise the horns and feet are grey.

The CATERPILLAR of the *holm oak* is covered with exceeding long hair, partly black, and partly of the colour of rusty iron, and there are fourteen prickles on the rump, placed in the same form as the petala of the flower of a red daisy. It turns to a reddish Aurelia, which afterwards becomes black; and then turns to an insect like the Fly of the Silk-worm, of a blueish chestnut colour, spotted with black. It had two large black tufts on its head, and a small one of black silk at the extremity of the belly.

The CATERPILLAR of the *zursach*, a *Surinam* plant, is large and green, and turns to a large Moth, whose body is adorned with six round orange coloured spots. It has four wings, and six feet, and is black, but curiously spotted. Its trunk consists of two pipes, which are used to suck the honey out of flowers; and after it has done, it rolls it up in such a manner, that it can hardly be seen. It is not easily killed, and it lays a vast number of white eggs. This plant also feeds a green Caterpillar, which becomes a white and black Moth, with a double trunk, like that of the former.

The CATERPILLAR of an anonymous plant is green, spotted with white, black, and red, and becomes an ash colour Moth, spotted with black. *Merian* says this plant grew in his garden, and yet he could not meet with any one that knew its name.

The feathered CATERPILLAR, so called from having a small brown feather on its rump, turns to a white vigorous Butterfly. There are several other Butterflies on different kinds of trees and plants, which are taken notice of by travellers, but in so vague a manner, that little or nothing certain can be said of them.

The sea CATERPILLAR, with coloured shining hairs on the sides like a rainbow, is by some called the sea Porcupine, by others the sea Mouse, and by others again the golden Worm. It is an uncommon insect, and chiefly to be met with in the *Western* ocean. *Linnaeus* informs us, that the mouth is furnished with threads like the hairs of animals, and have the shape of feelers; the body is in the form of an egg, covered with purple shining points or prickles, and glossy hair of the same length, of a greenish yellow; at the center there is a small opening, and under the skin of the back there are folded membranes, which resemble the gills of crabs. It has forty feet on each side, like so many parallel cones, connected to the edges of the body, terminating in points, and as crooked as a sickle; but on the inside there is a sort of soft hair. This insect, properly speaking, is not of the Caterpillar kind; at least we are ignorant of any transformation it undergoes.

The dirty brownish yellow CATERPILLAR is composed of nine or ten joints or rings, besides the head and tail; the head is roundish, and terminates in a snout or mouth, consisting of two sharp points. It is adorned with four rows of knobs, which rise like the heads of small brass nails, and are of a yellow metalline colour; but they are so bright and glittering, that it is impossible to imitate them by art, for they as much excel polished gold as that metal does brass. It was communicated to the late Mr. *Edwards* by

doctor *Mead*, and was doubtless brought from some distant country.

The HUNTRESS is a name given by *Goedard* to a Caterpillar, found upon the downs of *Holland*, which lives upon all kinds of grass and herbs, without seeming to like one more than the other. The author had one which became a Chrysalis on the twelfth of *July*, and a Butterfly on the fifth of *September* following.

There are a sort of hairy CATERPILLARS, which in *England* have the name of Palmer Worms, because they wander from place to place, like palmers or pilgrims; some call them bear Worms, because they are all over hair, and others Millers, but for what reason is uncertain. Many of these feed on all sorts of greens indifferently, tho' some of them do not.

The PALM-TREE WORM is a native of the *West-Indian* islands, and is bred in the heart of a sort of palm-tree, after it is cut down. They are as thick as a man's finger, and about two inches long; they appear to be nothing but a bit of capon's fat, covered with a fine transparent skin. There seems to be no entrails nor guts, when viewed with the naked eye; but with a microscope they may be discovered. The head is black, and fixed to the body without any neck. They are eaten by the *French*, after they have been roasted before the fire, when a small wooden spit has been thrust through them. When they begin to be hot, they powder them with a crust of rasped bread, mixed with salt, and a little pepper and nutmeg. This powder keeps in the fat, or at least sucks it up; and when they are done enough, they are served up with orange-juice. They are highly esteemed by the *French* as excellent eating. When they have been some time laid in the sun, they yield a sort of oil, which is excellent for cold pains, and especially for the piles.

The blackish-bodied PALMER WORM, with white spots on the sides, has the hair on the under part of the body of a sort of saffron-colour, but that upon the upper parts is grey, three rows excepted, on the neck near the head, which are of the same colour with those on the belly. This first changes to an *Aurelia*,

relia, and then to a Butterfly, which has been before described.

The *black* PALMER WORM has a yellow coloured belly, and spots of the same colour on the sides. It turns to a dusky Aurelia.

The *brownish yellow* coloured PALMER WORM is all over of those colours, except the stripes on the sides, that run obliquely from every joint, and the head is of a crimson colour.

The *dusky* PALMER WORM is of a brownish black colour on the belly, but the back and upper parts are of a dusky yellow, and it has a forked line on the face, of the colour of whey.

The *reddish bay* PALMER WORM has the sides of the belly of a greyish colour, and the body is variegated with yellow spots, which are of a deep black colour above. Hairs like rays proceed from them, of a yellowish colour, which are harsh, and grow to a point from the middle. It does a great deal of mischief among grass and corn.

The *grey* PALMER WORM is all over of that colour, except in the incisures, some of which are black, and others white, and there are spots of the same colours here and there. The bristles both above and below are placed like the teeth of a saw, and are very rough and strong, but of the same colour with the body.

The *black* PALMER WORM, *with yellowish hairs*, has a sort of pencil on each side the forehead, and another upon the rump, as black as a crow. There is also hair like wedges on the back, with white roots; but the other parts are blackish.

The *murrey* coloured PALMER WORM has, as it were, seven tufts of hair, in the shape of wedges, on the back.

The *variegated* PALMER WORM has all the incisures of different colours, and yet there is not one entirely of the same colour, but there is a sort of a silver stud upon each.

The PALMER WORM, variegated with black, blue, green, and yellow lines, running longways, seems to have golden spots between them. The hair

is very soft, and is of a very lively green ; but when it becomes an Aurelia it has a purple case.

The *green* PALMER WORM is of the colour of a green leek, only the incisures are whitish, and the hair in the middle of a brighter green.

The *hassle* PALMER WORM is all over of a dusky green, except a few black spots, and the horn that grows out of the rump, which is of a rose colour. It is chiefly met with on the leaves of hassle trees. There are two kinds of them, one of which is of a deep, and the other of a pale green.

The *negro-faced* PALMER WORM seems to have an embroidered coat, very artificially worked. On the forehead there are two hairy horns, instead of feelers, that perhaps serve for the same purpose ; and there are the like upon the rump or tail. The skin is of all the colours of the rainbow, and is variegated with roundish purple spots, which seem like so many studs, running along each side. The hair shines greatly, and strikes the eyes pretty strongly on a sun shiny day.

The *blue-faced* PALMER WORM is variegated with white, red, and blueish spots and furrows, and the hair is of a shining gold colour.

The *black-headed hedge-hog* PALMER WORM has a very black head, and a body variegated with dark blue spots ; but the hair is of a shining saffron colour.

The *pear tree* PALMER WORM has a head as black as ink, and a body furrowed with black, red, and white. From the shoulders, almost to the end of the back, there are livid tubercles speckled with white. The egg, from which this proceeds, is of a reddish bay, as is also the Aurelia, and the colour of the hair. It feeds upon the buds of pear trees. There is another of this kind, with only one tubercle or hump upon the back.

The *dusky yellow* PALMER WORM is of that colour, from the head to half way on the back, and then becomes of a white lily colour. On the belly there are a sort of studs, of a yellowish ash-colour.

The *nettle* PALMER WORM has feet of a dull yellow colour, but all the rest of the body is black ; the hairs are erect, and terminate in a sort of points, which

which will wound the fingers when touched, causing an itching at first, and afterwards an intolerable pain. From its stinging in this manner it has its name.

The *cabbage* PALMER WORM has a blueish head, and two railed yellow lines on each side the body, between which there is a grey space, speckled with black. The hair is of an ash-colour, and so is the Aurelia.

The *hedge* PALMER WORM has a head of a saffron colour, only on the snout there is a whitish triangle. The body is variegated with red, white, yellow, and black stripes or spots, placed in no regular order, but the hair is of a yellowish colour. It lives among hedges, and strips them of their leaves.

The *lesser hedge* PALMER WORM has a blueish face, and all the rest of the body is blue. The hair is of the same colour as the former.

The *crane's bill* PALMER WORM is of a pretty large kind, and is adorned with black belts, spotted with white; so that at first sight they appear to be of an iron grey. The belly and feet are white, and the spaces between the belts or girdles are of the colour of green leaks. It feeds upon weeds, and more particularly the herb called crane's bill.

The PALMER WORM, with a variegated body, is from the head, to the third incisure, of a whitish colour, like chalk, but the five next following are of an iron grey, and the three last of the colour of cerufs. The feelers consist only of hairs, and at the end of the tail there seem to be two more. Besides these, there are four upright tufts on the back, consisting of hairs, placed in a dentated order.

The *ragwort* PALMER WORM has a head and legs of a dull purple colour, and the belly of a palish green; but the body is of a bad green, variegated with black, yellow, and flame coloured spots. The colour of the hair is the same as that of the belly.

The *hedge bog* PALMER WORM has a body chequered and variegated with black and yellow, and it has spines or thorns that are yellowish. In the beginning of autumn, they change into an ash-coloured Aurelia.

The *variegated hedge-hog* PALMER WORM has the fore part of the body, as far as the middle of the back, of a yellowish black colour, but the hinder part is of a whitish yellow, and it has hard thick blueish spines or thorns.

The *bramble* PALMER WORM is of a blackish ash-colour, and on each side there are three palish yellow furrows; it is but thin of hair, which is black.

The *horned* PALMER WORM is variegated with green and yellow, but the hair on the middle of the back is grey, and the horn is notched.

There are other PALMER WORMS that feed upon vervain, hops, liquorice, night-shade, the elder tree, the elm tree, figwort, basil, and dill, but as they contain nothing very particular, we shall pass them over; however, we shall take notice of one, called the stinking Palmer Worm, mentioned by *Jesner*. It is like the horned Palmer Worm, and has so strong a smell, that any one would take it to be venomous. When it is angered it holds up its head, and the two fore feet, and seems to be blind. It is about as long and as thick as a man's finger, and has a few hairs scattered over the back and sides. The back is black, and the belly and sides of a reddish yellow. The body consists of fourteen joints, and there is a furrow on each, that runs along the whole length of the body; it has a black hardish head, and a forked serrated mouth, with which it lays hold of any thing, as with nippers. It has sixteen feet, in the same manner as most Caterpillars, and is doubtless of a poisonous nature.

The SPHONDYLE, called in the North of *England* an Andever, and in the south a Wurl Worm, is as long and as thick as a man's little finger, and has a read head; but the rest of the body is white, unless on the upper part, where it is blackish. It does a great deal of mischief in gardens and orchards, for it gnaws the bark off the fruit trees; it will also eat the roots of the wild cucumber, the wild vine, birthwort, centory, and other plants, which no other insect will touch. The next year after it is hatched, it turns into a May Beetle, which feeds upon the roots of trees,
even

even of the poisonous sorts, and causes them to wither away; which, when the gardeners perceive, they dig about them, and take them out to kill them. They do most mischief in *April* and *May*.

These Worms are of different sorts, for some are in the shape of a cross, of a whitish ash-colour, and a blackish head; but when they are touched, they fold themselves up like a ball, or rather like a wheel that women make use of in spinning. Another of this sort is red, and was found two feet deep in the ground; it had a very black head, a forked mouth, a yellowish red neck, a scarlet back, and the six fore feet of a reddish colour; but the belly, and the rest of the body, were quite yellow, only on each side there were eight reddish specks. It is as long as a man's middle finger, and in the summer it changes to a Fly.

Another of this kind has a shining thick body, which, from the middle of the back to the tail, is of a blueish colour; but the fore part is greyish, and it has a yellow head and feet, with a reddish forked mouth. It stirs its body in an odd manner, like the motion of waves, without changing its place, and then it seems to alter its colour. While it remains in the earth it is all over whitish, but when it is angered, it appears to be livid. This is much in the same shape as the former, only it rolls itself up. From this worm a very large Fly proceeds, with four wings.

There is another insect of this kind, found at the roots of onions, and is much of the same shape as the former, with a green head, fourteen feet, and a horned whitish green tail. The body is variegated with green, yellow, and murrey colour. It is called by some the Onion Worm.



C H A P. XIII.

Of Insects of the SPIDER kind.

THE most common SPIDERS, in these parts of the world, are the house Spider, which weaves its web in neglected rooms. The garden Spider, that

weaves a little round web, in the center of which he keeps in the day time. The black Spider, that inhabits the holes of old walls. The wandering Spider, that has no abode, like the rest; and the field Spider; besides many others that we shall take notice of as we go along.

All these SPIDERS have some resemblance in common; and they have also a characteristick, which distinguishes them from each other. Every Spider consists of two parts, the head and the breast, which is separated from the hinder part, or the belly, by a slender string. The fore part is covered with a hard shell, as well as the fore paws or legs, that adhere to the breast. The hinder part is cloathed with a supple skin, beset all over with hair. They have several eyes on different parts of the head, generally eight in number, and sometimes only six, two before, two behind, and the rest on the sides of the head. They have all eye-lids, and are covered with a hard polished crust. As their eyes are immoveable, and they are furnished with such a number of them, that they may see what is doing all round them.

They have two prickles on the fore part of the head, or rather two branches, rough, with strong points, or dentated like two saws, and terminating in a claw, like that of a cat. A little below the point of the claw there is a small hole, through which it seems to emit a very active poison. This is the most dreadful weapon they have against their enemies, and they can cover, or stretch them out, as they have occasion. When they do not make use of these claws, they lay them down on the branches like a sickle on its handle.

They have all eight legs, articulated like those of Lobsters, and at the end there are three crooked moveable claws, namely, a small one on the side, placed like a cock's spur, by the assistance of which they adhere to the threads of their webs; and there are two others larger, the inside of whose hook is dentated, and serves to fix them on any thing they please, or to walk up the side of a wall, and even with their backs downward. The most polished bodies, such as looking glasses and marble, have such inequalities,

that

that they can lay hold of them with their claws. But they do not always make use of these, there being near the claws two tubercles, or a sort of sponges, on which they can walk in a softer manner, reserving the former for other purposes, wherein sharp claws are required. If these legs are plucked off, like those of Lobsters, others will grow in their place.

SPIDERS, besides the eight legs already mentioned, have two before, which may be called arms, because they are of no service in walking, but are used in holding and managing their prey. Though they are thus armed, they could not go to war with success, if they were not as well furnished with toils to catch their game, especially as they have no wings to fly after it. For this reason, Spiders have the art of spinning threads, with which they weave their webs, and which are a sort of nets, spread out on purpose to take their prey; and they lay them in those places where the Flies are most likely to pass and repass almost continually. The Spider lies in ambush behind the net, and patiently waits for its enemy, who is not aware of it.

SPIDERS have five tubercles or nippers, at the extremity of the belly, whose apertures they can open and shut, enlarge, or contract, just as they please. It is through these apertures that they spin the gluey substance, with which their bellies are full. In proportion as the spider lets this glue pass through one of the apertures, the thread grows longer, as she recedes from the place to which she had fixed the end. When she contracts the apertures of the nipples, the spinning ceases, and she remains hanging thereto. She afterwards makes use of the thread to reascend by the help of her claws, much in the same manner, as some men will swarm up a rope. However, this is not all the use which she makes of this thread.

When a house SPIDER is to begin her web, she first chuses a place where there is a cavity, such as the corner of a room, that she may have a clear passage to pass freely on each side, and to make her escape, if there be occasion. She throws upon the wall a small drop of this glue or gum, and lets some more pass through

through the small aperture, and the thread lengthens as she draws back, till she has got to the other side, where she would fix her web; then she lets another drop fall, by which she fixes it to that place; thus she passes and repasses, till she has made it as large and as strong, as was at first designed. Those that have seen them at work, affirm, that she makes more threads than one at the same time, that she may finish her net the sooner. However, it is observable, that the first row of threads, which may be called the warp, lie all parallel to each other; after which she crosses them with another set, which may be named the woof, and by means of the same glue she fastens them to each other.

A SPIDER seems to know very well, that if she appeared openly, or in sight, she would miss of her prey; and therefore she weaves a small cell for herself, where she lies hid, and keeps upon the watch. There are two passages out of it, the one above, and the other below, that she may walk out which way she pleases, to visit her work, and keep every thing clean; for she takes away, from time to time, the dust that is got upon it, or rather shakes it off, by giving it a stroke with her paw, which if she did not do, it would soon be over-loaded, and consequently the fabric would be destroyed.

There are generally a sort of threads, that proceed like rays from the center, where she is hid, and where she stands sentinel; so that she can readily perceive when any part of the threads are touched, when the game is at hand, upon which she immediately erects herself for action, remains as if immoveable, till she has found her prey perfectly entangled, and then flies upon it in the most speedy manner possible. Another advantage she receives from the mechanism of her cell is to have a retreat, where she may devour her prey in safety, and conceal their carcasses, that they may not prevent others from falling into the same snare.

The magazine of the gum or glue does not always last, for when the spider grows old, it is entirely exhausted; and then to get her living, she goes to the web

of a young one, who either out of kindness, or fear, gives place, and weaves herself another.

The labour of the garden SPIDER is quite different from the former, and yet is not performed with less art. Many people believe that she flies from one tree to another, but this is a mistake; for when she fixes one end of a thread to a branch, or any other substance, then with her two hind paws she draws out one or more threads from the nipples, three or four yards in length, which she lets float in the air. These threads being driven by the wind on one side or other, to some neighbouring body, as for instance, a house, a rail, or a tree, or a stake on the other side of a river; this thread fixes itself thereto, by its natural clamminess; then she draws it a little, to see whether it is fast or not; and this becomes a bridge, on which the Spider can pass or repass at pleasure. This done, she doubles or triples the thread, according to her own fancy; and advancing towards the middle thereof, she there fixes another, and lets herself down with it, till she meets with a stone or plant, or any other solid substance, on which she may rest. She reascends on the second thread to the first, and then begins a third, which she fixes in the same manner. When she has thus fixed three threads, she strengthens them, by making them double. Then she endeavours to find out a square place, which is not very hard to do, and which is owing to the artificial management of the threads. However, it is remarkable, that she never leaves off spinning, while she passes backward and forward. Then she goes to the right and left, and by this means forms a square, or a figure approaching thereto; then she weaves a cross in the same manner, whose point in the middle becoming the center, from which she lays all the rest of her threads, like so many spoaks of a wheel. She places herself at the center, where all these threads cross each other, and then she forms a small circle round it, and then another, and so on, proceeding always in a circular manner, till at length she comes to the large threads, which support the whole work.

The

The net being thus spread, she places herself at the center of all these circles, with her head downwards, because her belly, which is fixed to a very slender neck, would fatigue her too much in any other posture; whereas, in this, her paws and breast support the belly. There she waits for her prey, but seldom very long; for the air being full of Flies and Gnats, that pass backwards and forwards, some of them soon fall into the net. When the Fly that is taken is small, it is dispatched upon the spot; but when it is large, and makes some resistance, the Spider wraps it up with her web, binding it so fast, that it is not able to stir either legs or wings, and then she carries it to her nest, which is underneath the web, and hides it under leaves, or a tile, or some other commodious shelter, to keep it from the rain.

As for the *black* SPIDER, that lodges in cavities, she only weaves a sort of a web about the mouth, leaving a round hole in the middle, as a door to go in and out at. When an insect passes near the place, it never fails to move one of the threads which run out on all sides, like so many rays; which the Spider having notice of where she lies in wait, immediately runs to catch it. This Spider is more mischievous than the rest; for if she is taken up with two sticks, or otherwise, she will be sure to bite the instrument that holds her. She is also much harder than the rest, so that a Wasp, for instance, which by its sting, and by the hardness of its body, puts the other sort to a great deal of trouble, can make no impression upon this; for the black Spider cannot be penetrated with its sting; but on the contrary, she can break the bones and the scales of the Wasp with her nippers.

The *wandering* SPIDERS are of several sorts and colours. They generally run and leap; but as they have not thread enough to wrap up their prey upon occasion, much less to stop the motions of the wings and legs of the Fly, nature has furnished them with two fore paws or arms, and two tufts of a sort of down, with which they can restrain the motion and agitation of the wings of their enemy. There is another black sort, less than this, which weaves her web

in *September* and *October*, among the grass in the meadows, or in the stubble, which remains after the harvest; however, she lets some of the threads be carried in the air by the wind, insomuch that it is often full of them. These threads unite, lengthen, and stop, at any place they are driven to, and the Spiders make use of them in such a manner, that one would think they could fly, or they are carried along with them by the wind. There is nothing more remarkable in these, than the extreme length and firmness of their legs; for as they are designed to live among slender grass and weeds, the smallest blade would stop and embarrass them, if they had not these long legs, to raise them higher than the common grass, and to run speedily after their prey.

With regard to the laying of their eggs, Spiders have more care and foresight than is generally thought; for they are so far from leaving them to chance, that they weave a very strong web wherein to lodge them. Of this they make a strong bag, wherein they lay their eggs, and it is hardly credible what pains and trouble they are at in performing this work. This bag is often seen joined to the hinder part of their bodies, in such a manner, that many take it to be a part thereof; if by any accident it happens to be struck off, the Spider never fails to join it thereto again by its natural glue. When the eggs are hatched, the young get upon the old one's back in such a manner, that, without a nice examination, you would take them to be part of their body, though perhaps there are a thousand in number.

Another sort of SPIDER lays her eggs in a bag, made like a cap, which is sometimes fixed to a wall, and sometimes to a leaf, where she sits upon them night and day, and she would sooner suffer herself to be killed, than abandon them till they are hatched.

There is yet another sort, that make two small bags, of a reddish colour, which they hang up with threads, and before them they place a tuft of leaves to hide them from Birds and Wasps, which would otherwise fall upon the bags, which are full of eggs; for the wind keeping them continually in motion, it prevents them

them from taking notice of what hangs behind. It is wonderful to consider the strength which all Spiders in general endow their bags with, and they generally hang them up against a wall.

The TARANTULA has some resemblance to a house Spider, but it is the largest yet known in *Europe*. It is a native of that part of *Italy*, called *Apuglia*. Its body is three quarters of an inch long, and of the thickness of one's little finger; the colour is generally of an olive brown, variegated with one that is more dusky. It has eight legs, with three joints each, and eight eyes; from the mouth proceeds a pair of nippers, dentated or ferrated on the inside, which are solid, and so very sharp, that they can easily pierce the skin therewith. Between these and the fore legs, there are two little horns or feelers, which it is observed to move very briskly, when it approaches its prey. It is covered all over the body with a sort of short soft down, and propagates its species like other Spiders, by laying eggs, which sometimes amount to an hundred or more. In the summer months, particularly in the dog-days, the Tarantula, creeping among the corn in the fields, bites the mowers and passengers; but in winter it lurks in holes, and is very seldom seen. The part which is bitten, is soon after discoloured with a livid black or yellowish circle, attended with an inflammation. At first the pain is scarcely felt, but a few hours after there comes on a violent sickness, difficulty of breathing, fainting, and sometimes trembling. The person who is bit, after this does nothing but laugh, dance, and skip about, putting himself into the most extravagant postures; but this is not always the case, for he is sometimes seized with a dreadful melancholy. At the return of the season in which he was bit, his madness begins again, and the patient always talks of the same thing; sometimes he fancies himself a shepherd, a king, or any other character that comes into his head, and he always talks in a very extravagant manner. These troublesome symptoms sometimes return for several years successively, and at length terminate in death.

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Gentlemen, who have travelled into *Italy*, affirm, that this odd distemper is cured by a remedy altogether as odd, which is musick; for this only will give them ease, and they make use of the violin in particular. They musician plays several tunes, till at length he happens to find one that makes a great impression upon the patient, at which time he begins to dance, and continues so doing, till he is all over in a sweat, which forces out the venom that did the mischief. This dancing sometimes continues for three or four hours before the patient is weary, and before the sweating is copious enough to cure the disorder. Such is the common account given of this animal. *Swammerdam* however assures us, that he has been informed for a certainty, that even in *Apuglia* itself, the whole of the effects of this creature's bite is looked upon as entirely fabulous, and that it is only kept up as a vulgar error by some strolling musicians, who get a livelihood by playing the supposed venom away.

The SPIDERS of the *West Indies* have much the same properties as those of *Europe*, for they have almost all a sort of bags, which seem to be made of fine leather, though it is woven with their threads; in these they lay their eggs, and either sit on them to hatch them, or to preserve them from being devoured by other insects. However, in the woods there are some that are not common, for they are an inch and a half long, and an inch broad; the fore part is made like a cushion divided into small squares, and the belly or hinder part is of an oval shape, variegated with spots and lines. They are all grey, and have very long legs, which are hard and hairy like the paws of a flying Stag.

The *Martinico* SPIDER is divided into two parts, and the belly or hinder part is almost as large as a hen's egg, and covered all over with pretty long hair. The fore part is the shortest, and not quite so thick, and in the middle of the back there is a small round opening, which will hold a pea, surrounded with hair, a little longer than that on the other parts of the body. From each side of this part there proceeds five legs, longer than a man's finger, all hairy, and consisting
of

of four joints, and each has a pair of nippers, very hard, which have the appearance of red horn; it has two teeth in the mouth of the same substance, about half the length of a common pin, and they are crooked, and as sharp as needles. They have two small black, shining eyes, which are not much larger than pin's points. They make a bag as large as an egg-shell, whose outer covering has the appearance of fine leather; but within there is a down as soft as silk, in which they lay their eggs. This bag is placed underneath their bellies, and they always carry them about along with them. There is another sort like pine-apples, but not quite so big, and part of the hair on the top of the body is green. The inhabitants are very much afraid of this insect, and affirm, that it is more dangerous than a Viper. When they are irritated and put into a passion, they throw out a venom, which would render a man blind, if it should fall on his eyes; even the hair of this insect is venomous, and if touched while alive, it stings like nettles. If it be taken up and pressed never so little, it stings with a weapon not so big as that of a Bee, but so venomous, that recourse must be had to the same remedies that cure the bites of Serpents.

Bosman, in his account of *Guiney*, tells us, that he met with a Spider of a monstrous size, with a long body and a sharp head, and broader in the fore part than that behind, but not so round as most Spiders are. It had ten legs that were hairy, and as thick as a man's little finger. This Spider is called *Ananse* by the negroes, who foolishly believe, that the first man was made by this insect.

The *Bermudas* SPIDER is of a very large kind, whose body consists of two parts, the one flat, and the other round, and they are so large when their legs are extended, as to cover a man's hand. They are beautifully variegated with divers colours, and have an orifice on their backs, like those in the *West-Indian* Spiders already taken notice of. Their mouths are covered with a sort of grey hair, intermixed with bright red, and they have a crooked tooth on each side, of a fine polished substance, extremely hard, and of
a fine



*West Indian
Spider. 266*



*Redish black
Earth Spider.*



Spotted Spider



*The Cicindela, of
Mouffet 33*

a fine bright shining black, insomuch that they are often set in gold and silver to serve for tooth-picks. When these insects grow old, they are covered all over with a kind of brownish black down, which is very soft and smooth, and shines like velvet. The round part is much of the shape of a large pigeon's egg, and under that, which is flat, their legs grow, five on each side, with four joints and claws at the end. They cast their downy sloughs every year, as well as the two fine teeth abovementioned. They live upon Gnats and Flies, and spread their webs from tree to tree, which are very large and strong. In the Philosophical Transactions it is said, that these Spiders will spin their webs between trees, that are sixteen yards distant from each other, which they do by spitting their web into the air, and the wind carries it from tree to tree. This web, when finished, will catch a bird as big as a Thrush, if this account is to be believed; but we are of opinion, that most readers will think it to be altogether improbable.

There are many sorts of SPIDERS in the *East-Indies*, of a very different bigness, some of which are four inches long, and have very thick legs. Others have eight feet, a thick speckled body, and a round head, with brown legs. These have two teeth like hooks, wherewith they bite very strongly. They make tooth-picks with these teeth, in the same manner as at *Bermudas*.

At the *Cape of Good Hope* likewise they have several sorts of Spiders, which differ in bigness, shape, and colour, as well as in the manner of making their webs. Some of these are venomous, and others not, and some delight to be in houses, while others keep always in the fields. But there is a small sort, more dangerous than the rest, being no larger than a small pea, black, and very active. It fixes itself on the walls of houses, or to planks, and in the fields it spins its web on the grass. Its bite is so venomous, that it would infallibly kill, without a proper remedy. A negroe, bitten by one of these Spiders, neglected the wound too long, and died in a few days. This insect likewise attacks, pretty often, herds of large and small cattle,

cattle, and does them a great deal of damage; for this reason the *Europeans* take particular care in keeping their houses and stables clean, to preserve themselves and their cattle from the bites of these dangerous animals.

The *large SPIDER* of *South America* makes its nest on guava trees, in the shape of the webs of some Caterpillars. Their bodies are covered all over with hair, and they are furnished with sharp pointed teeth, which give dangerous wounds; for at the same time they distil a liquor into them of a malignant nature. They generally feed upon Ants, and sometimes they will take the young of small birds out of their nests, and suck their blood. In particular, they are great enemies to the Humming birds, which they will often attack and kill. They shed their coats or sloughs every year, like the *Bermudas* Spiders.

The *small scarlet SPIDER* is a native of *England*, and is found in gardens and orchards, on the bodies of trees. It is not much bigger than a large Flea, nor is it divided into two parts, like most other Spiders; but it has a small round head, that stands from the body, furnished with two long feelers. The body itself is oval, and has three legs on each side; but though it is so small, it is accounted venomous.

The *reddish chestnut coloured SPIDER* is very remarkable for its legs and feelers. It has eight of the former, four on each side, and each joint seems to be placed in a socket. The feelers are globular and hairy at the ends, the globes consisting of bright white knobs encircled with yellow, which give them the appearance of a small stone set therein. It has eight eyes, placed in a semicircular form, and about them the colour is black, but the other part joining to the belly is of a reddish chestnut. The upper side of the belly is of a dark ash colour, and the legs are reddish.

The *small long legged SPIDER* is so finely marked, that it is impossible to describe it either in words or colours, there being so fine a mixture of green, red, and black, interchangeably put together in curious shapes. It has eight legs, which are very long, and marked in the same curious manner. The body is perfectly oval,
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is without any divisions in the body, and the head does not stand out therefrom. The eyes are so small as not to be discerned.

The *dark coloured* SPIDER has a broad streak of light hair-colour in the middle of the back, and a mark of the same, in the shape of a diamond, on the upper part of the belly. It has six eyes, two clavated feelers, and eight long legs, which are finely spotted. It is divided into two parts, as other Spiders, but the head is not distinct from the fore part of the body. In *June* it carries its egg-bag under its belly.

The *house* SPIDER, *with legs finely spotted with black*, has hairs or bristles growing from each joint, and it has eight eyes, eight feet, and two clavated feelers. The fore part of the body is almost round, and that behind perfectly oval; some give the webs of these Spiders for the cure of agues.

The *jumping* SPIDER, that is one sort of them, is of a very small kind, and has eight eyes, placed in a circular form; and it is observable, that all those that have their eyes placed in this manner, catch their prey by jumping upon it, as a cat does at a mouse. The belly part of the body is of an oval form, and has two clavated feelers, and four legs on each side, fixed to the breast. When beheld through a microscope, it appears to be beautifully variegated with black, chestnut, reddish, and white colours all over the back, belly, legs, and feelers, and it is all over rough and hairy. Mr. *Evelyn* found one of this sort near *Rome*, which was speckled with black all over the body, and through a microscope appeared like the feathers on a Butterfly's wing. It is very nimble by fits, sometimes leaping like a Grasshopper, then standing still, and setting itself on its hinder legs, will very nimbly turn its body. and look round it every way. If it espies a Fly at three or four yards distance, it will not make directly to her, but conceal itself as much as possible, till it arrives directly under her, and then creep slowly up to her, seldom missing its aim, and it jumps directly upon the Fly's back. But if, in the mean time, the Fly takes wing, and fixes upon another place, it will whirl about very nimbly, by which means it always keeps
its

its head towards its prey. It has been sometimes seen instructing the young ones how to hunt, and when any of the old ones missed a leap, it would run out of the field, and hide itself in crannies, as if ashamed. In short, nothing can be more diverting to a naturalist, than to observe the cunning and stratagems it uses in hunting.

The *beautifully streaked* SPIDER is speckled with black all over its body and legs, which are very long. It has eight eyes, standing in the form of a segment of a circle; and has two feelers very slender at their roots, and of a long oval shape at the ends. Both parts of the body are of an oval shape, and the tail is forked. There are two streaks on the back of the belly part, alternately spotted with white and black. The forks at the tail appear like feathers standing up, which it can open and shut like a fan, at pleasure.

The SPIDER, *with a transparent back and legs*, has eight eyes, and the belly part of the body is vastly larger than the breast; on the back of it there is a dark space or mark, that runs two thirds of the length as far as the tail, and the back and legs appear transparent, like clear horns. It has two pretty long feelers, which are smaller at the root than at the end, and the legs, which are long, are alternately variegated with different colours, though not very distinct, on account of their transparency, and there are four on each side the breast.

The SPIDER, *marked with white spots and lines, in a curious regular manner*, has yellowish and very hairy legs, spotted with a dark brown. The feelers also are spotted, and are short and thick at the ends. The breast or fore part is very small, in proportion to the belly part, the back of which last is regularly marked with white spots. Near to the breast part there are four spots like pearls, placed exactly in the form of a cross, and where they meet there is a small white one. Next to that there are two other spots, in the shape of pearls, placed transversely, in the middle of which there is another small one. Near the back part there are three spots on each side, like half-moons, and between them others placed in a very regular

regular order. It has six eyes, placed in an oval form, and it may be met with in gardens, at the latter end of *July*.

The *hair-coloured* SPIDER has, on the upper side of the belly part, a yellow mark, in the shape of a cross, and round it there is a broad streak, of an oval shape. The legs are of a light hair-colour, spotted with black, and there are bristles of the same colour at the joints. It has two feelers, small at the root, and pretty thick from above half way to the ends; the belly part is oval, the breast part square, and it has six eyes.

The CARTER, or *long legged* SPIDER, has legs of a prodigious length, and there is no distinction of the back and belly part; for the whole body appears to be nearly round, and marked with ten spots about the edges. The feelers are small at the root, and become gradually thick to the ends. There are two particularities belonging to this Spider, which may be discovered by a microscope; one is the curious contrivance of the eyes, which are only two, and placed on the top of a small pillar or hillock, rising out of the middle on the top of its back, or rather the crown of its head; for they are placed on the very top of this pillar, back to back, with transparent pupils looking towards each side, but somewhat more forwards than backwards. They have a very smooth and protuberant horny coat, and in the midst of it the very black pupil is seated, being surrounded with a sort of a grey iris, and the pillar, or head and neck, seems to be covered with a crusty shell. These eyes do not appear to have knobs or pearls, like those of other insects.

The other peculiarity is the prodigious length of its legs, in proportion to its body, which are jointed exactly like those of a crab, and terminated by a small case or shell, fastened to the body in a very wonderful manner, and which include a very large strong muscle, whereby this little animal is not only enabled to suspend its body upon these eight legs, but to move very swiftly over the tops of grass and leaves. The mouth is like that of a crab, the shell is speckled.

with a sort of feathers or hairs, and the legs also are hairy; in short, it has some resemblance to a crab in most particulars, except the length of its legs.

The SPIDER, called the PHALANGIUM, is of a venomous kind, and is very large, but in shape it is like an Ant. The head is red, and the rest of the body black, speckled with white. There is another Phalangium, in shape somewhat like a black grape, having a round, black, shining, globous body, with very short feet or legs, which seem to be imperfect, and yet it can run very swiftly with them.

The *common house* SPIDER has a round body, or rather oval, which is almost transparent. The colour is pale, and when it stands erect upon its feet, it is not unlike a painted star. The skin is soft, smooth, and polished, insomuch that some have imagined they have seen their own faces reflected from it. The legs are long, round, and slender, and of a very quick sense of feeling, being eight in number. It is not venomous, nor any way hurtful; for its bite will cause a sort of tickling, rather than pain. This is certain, that they may be safely taken inwardly, as country people often experience, when they swallow them for the cure of agues. When it is well fed, it will cast its skin, not once a year, but almost every month.

The *rose* SPIDER, so called from weaving its web in rose bushes, has an oval body, and a small forked head, under the belly, and the back is marked with many white spots. It will grow in a short time, from the size of a small pea, to above an inch in length.

The *brown* SPIDER is somewhat transparent, when placed between the eye and the sun. It is to be met with in woods and hedges, and weaves a very thick web, that it may withstand the force of the rain and wind. It has a forked mouth furnished with feelers, over which, on the head, there are two small whitish spots, which perhaps may be the eyes, and the whole body is a little hairy.

The *wild marjoram* SPIDER has a body as round as a ball, with its back marked with fifteen white spots, and the vent is of a quadrangular shape. It

weaves

The large Web-Spinner Spider. 266



Wandering Spider. 262



The Wall Spider. 273



American Spider. 268

weaves a very rude sort of a web, among the leaves of wild marjoram.

There are three *wall* SPIDERS, which inhabit old walls, and the ruins of houses; they weave but small webs, and wander out in the day time, in search of prey, which they fall upon with great force, and drag them into their hole. The largest is of a dusky colour, with an oval head, and a round globous body, each side being adorned with two little short white lines; but about the middle of the back it is more whitish, and the legs are variegated with blackish spots. That of the middle size is of a greyish colour; on the middle of the back there are three white spots, like pearls, and that next the neck is the largest and longest. The third is of a blacker colour, and the back is marked with a white right-angled cross, for which reason it is called by some, the holy Spider. In this particular it resembles one above described. It is of the leaping or jumping kind, and is very voracious, for it will lay up nothing for the next day.

The *short black* SPIDER carries a snow white egg-bag under his belly, and runs very swiftly; when this bag is broken, a great number of small Spiders come out, which go abroad in the day time to feed, and in the evening get upon its back, where they rest all night. There are jet-black Spiders among rotten wood, and in the holes of trees, with very short feet.

The *white* SPIDER has a compressed broadish body, of a white colour, and long slender legs. The forehead is marked with a spot, and each side with a reddish line. There are blackish red Spiders, with an oblong body, and a sharp tail; and there are red Spiders of two kinds, one of which lies in holes of the earth, and has a red breast, with reddish yellow feet, and the tail and body of a dusky colour, with a yellowish cast.

Linnaeus takes notice only of six Spiders, namely, the greatest Spider; the house Spider; the bag-bearing Spider; the water Spider; the bird Spider; and the Tarantula.

Authors have given us catalogues of other sorts of Spiders ; but, as they consist merely of names, without the least description of their particular parts, we shall here omit them as of no use.



C H A P. XIV.

*Of SCORPIONS, CENTEPEES, GALLY-WORMS,
and HOG-LICE.*

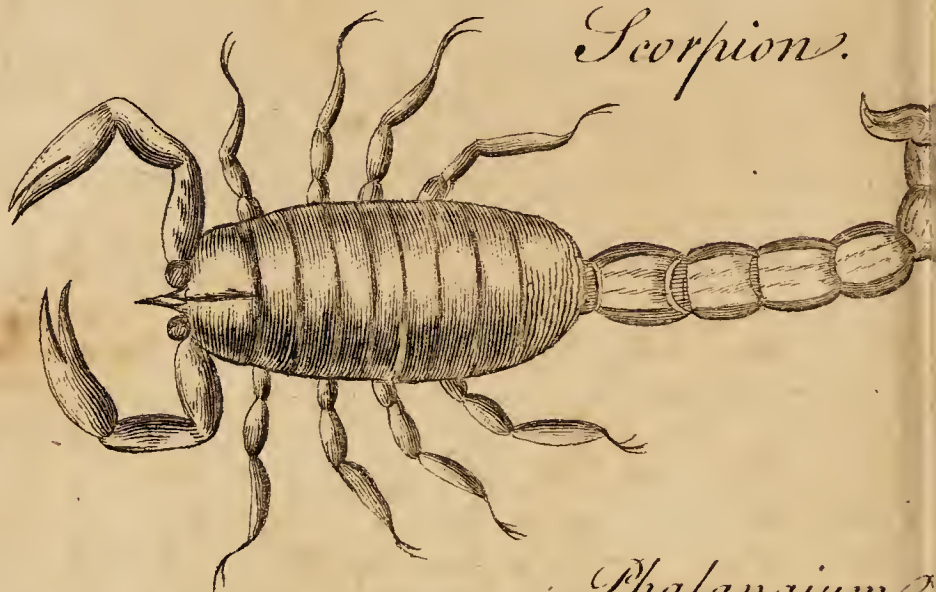
A SCORPION is an insect with a body in the shape of an egg, which seems to be covered over with foot, and its tail consists of several globous bodies or joints, the last of which is the longest, and is armed with a single or double prickle or sting, a little bent at the end. It has eight feet or legs, and claws not unlike those of a Lobster, armed with nippers. The head seems to lie hid at the top of the breast, with such small eyes, that authors take no notice of them.

Old authors mention seven kinds of Terrestrial SCORPIONS, the first of which is whitish, and not at all deadly ; the second has a reddish mouth, and its sting produces heat, a fever, and intolerable thirst. The third is blackish, and its sting causes odd motions of the limbs, and a laughter like that of fools. The fourth is greenish, and its sting is attended with cold and shivering, and gives the patient a sense of being in very cold weather. It has eight or nine joints at the tail, which is the reason that it inflicts a deeper wound. The fifth is of a livid pale colour, with a large strutting belly ; this not only strikes with the tail, but bites with a venomous tooth. The sixth is like a Sea Crab, though it does not want a tail ; but it has a large roundish body, which makes it look like a tailed crab. They are of various colours, some being black, others of an iron grey, and others green. The seventh is nearly in the shape of a crab, with two large nippers, and it lives in holes by the sea side. When it is boiled it becomes red like a Lobster.

The



Scorpion.



Phalangium.



Centipede.



The *South-American* SCORPIONS are in the shape of the *European*, but their sting is not so fatal, for the wounds they inflict are easily cured. They lurk in houses, behind old stools, benches, and chests, and are very large, some being five or six inches long. The translator of *Nieuboff* affirms, they are five or six feet long; but this must be a mistake for inches. A Carpenter was stung by one in the *West-Indies*, when he was repairing a church, and it produced no greater disorder than the sting of a Wasp; it was soon cured by laying a compress on it dipped in rum. The females lay their eggs in a web, which they spin from their bodies in the manner of Spiders. The eggs are no larger than pins points, and they carry the bag along with them till they are hatched, at which time they get upon the back of the old one, which turns her tail over them, and defends them with her sting. However, there is another sort in some of the islands, whose stings are much more dangerous than those of the former, for which reason they are very much dreaded by the inhabitants. It is certain that they change their skins, as Crabs do their shells, because there are many of them found quite whole, though empty, in the places where they used to lurk, except a cleft under the belly, through which their bodies come out.

At *Batavia*, in the *East-Indies*, there are SCORPIONS a quarter of a yard in length; but those of a lesser size are so common, that you can scarce move a stool, bench, chest, looking-glass, or picture, without being in danger of being stung by them. The small ones are about a finger's length, and composed of many joints of the thickness of a goose-quill. The colour is yellow, variegated with brown streaks, and the fore claws have two sharp pinchers; their tail is long, and lies turned upon the back, at the end of which there is a sting, which sometimes does a great deal of mischief. They have eight long legs, not unlike those of a Crayfish, and the sting is accounted mortal, unless prevented in time. Many believe that they are greatly pestered with Ants; but these are only the young Scorpions, that get upon the backs of the old ones.

The SCORPION, at the *Cape of Good Hope*, is from two inches and a half, to three inches long, and its colour is a greenish brown, speckled with black. It is in shape exactly like a Cray-fish, except the tail, which is more long and slender. The sting is very painful, and often puts life in danger.

The SCORPION, on the coast of *Guiney*, is upwards of three inches in length, and has four legs on each side, besides two claws armed with nippers, which make a very formidable appearance, they being very thick and strong, and between the nippers and the head there are three globous joints. The body consists of nine joints, and the tail of ten, which has a hooked weapon at the end, wherewith it stings. There are some on this coast as big as small Lobsters, and have the same sort of claws and feet; but their bodies are covered all over with long hair. Some of them have a small bladder full of poison, of half a finger's breadth, at the end of their tails, which they spirt out when they strike either man or beast, and the venom produces certain death.

The *coal-black* SCORPION is accounted the most venomous of all, and is very common in *Persia*. It is of the thickness and length of a man's finger, and the body has some resemblance to an egg; but altogether it is shaped like a Cray-fish, only it has a blunter head, and a less body. It has eight legs and two claws, with a long knotted tail, whose knots appear like so many little bladders, at the end of which is a very venomous sting. In some parts of *Persia*, the inhabitants dare not sleep in ground rooms, for fear of these insects.

The *Barbary* SCORPION, when full grown, is six or seven inches long, its body is covered with a firm skin, which is brown, with a mixture of yellow, or flame colour. It is of an oval shape, and has small eyes, with eight legs, that are not very strong; each of these is composed of six joints, and terminated by a pair of sharp claws. The legs are paler than the body, and are a little hairy. The claws, with nippers, are like those of Crabs, are large, and of a black colour, each of which is composed of four joints.

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The body consists of several joints, divided by den-
ticulations, as is also the tail. The last joint is ter-
minated by a pointed weapon, which is a little crook-
ed, bending a little downwards, as in most of the
other kinds.

Linnaeus takes notice of four SCORPIONS, the *Indi-
an*, the *African*, the *Italian*, and that of *Barbary*.

The CENTEPEE, or CENTIPES, is so called,
from its great number of feet, for which reason, in
some places, they are called Millepedes, or thousand
feet; but improperly, because that term is always
bestowed upon Hog-lice by naturalists. In *Latin* the
name is *Scolopendra*. It is very common in many parts
of the world, especially between the Tropicks. There
are several sorts of them in the *West-Indies*, one of
which bites very dangerously. They are longer than
a man's finger, and as thick as a goose-quill, but
more flat, and of the colour of rusty iron. They
have a round head, with two small, but very sharp
teeth, and the whole body is divided into ten or
twelve joints, and as many transverse black lines; at
the bottom of each of which there are two pretty
long feet. There are two small horns on the head,
and the tail is forked; they live among rotten wood,
and when they are touched, they are sure to bite. The
wound produces the same effect as the sting of a
Scorpion, and the same remedies must be made use of
to cure it.

The CENTEPEE of the *East-Indies* is about five
or six inches long, the thickness of a man's finger,
and of a ruddy colour. They consist of many joints
and bones, and have two claws or pinchers, where-
with they wound as dangerously as the Scorpion, oc-
casioning inexpressible pain. They lurk like them in
holes, behind old chests and benches.

These insects are very common at the *Cape of Good
Hope*, some of which are red, and others white; they
are three inches long, and about half as thick as a
man's finger. They are covered with hair, and seem
to have no eyes; but there are two feelers on the
head, which they make use of to find out the way
they are to pass. This is a very venomous animal,

and the bite is as dangerous as that of a Scorpion. A sailor, that was bit by one on board a ship, felt an excessive pain, and his life was supposed to be in danger; however he recovered, by the application of three roasted onions to the part that was bit, and he soon was quite well.

The *African* CENTEPEE is four inches and a half long, and as thick as a swan's quill; the colour of the whole body is of a shining brownish black, and to each division or incisure a foot is annexed, of a yellowish colour, sixty on each side. If this insect should be cut in two, it is affirmed that both parts will live. When it is irritated it will bite very hard, insomuch that though a man has a glove on, the teeth will penetrate quite through. It has a forked mouth, and two feelers like the former.

The *American* CENTEPEE has a flame-coloured line that runs down the back, and the sides resemble brass; it has a vast number of feet like hairs, and an exceeding small head; and they move so readily backward or forwards, that some have fancied they have two heads. Another, that was brought from *Cape Augusta*, was somewhat larger than the former, and had seventy livid divisions or incisures, and twice as many feet.

The *common* CENTEPEE is to be met with in *England*, and is about an inch long, with a flat thin body, of a brownish colour. The legs are short and yellowish.

The CENTEPEE, *with thirty feet or legs*, is not above half an inch long, and no thicker than a wheat-straw; it is flat, and of a red colour, and the last pair of legs are very long, which makes it seem to have a forked tail.

Linnaeus has only three sorts of CENTEPEES, that with seventy feet on each side, that with fifteen, and that with twenty.

The GALLY WORM is called in Latin *Julus*, because it is supposed to be like the catkins of walnut and halle trees, which have the same name in Latin. They are a sort of short Centepees, and have more feet than any other insect whatever. Some of these
are

are smooth, and others hairy, and one of the former was found on a cabbage-lettuce, about the thickness of a rush, and near two inches long. It had a black head, and a back of a golden yellow colour; the belly was of a blueish silver colour, with a great many feet, like hairs.

There is another kind quite black, except a white line that runs from the head to the tail, along the middle of the back. There is a third kind, of a dull yellow colour, only the head is reddish, as well as the feet; and the feelers, as well as the hairs near the tail, are livid. There is a fourth sort, of a reddish black; but the feet and feelers are of a lighter colour. Some of these lie hid in the moss growing on the barks of trees, and others under stones, and among rubbish.

Mouset never saw but two of the hairy kind, one of which was somewhat above an inch long, had a body that tapered from the head to the tail was of a whitish colour, though the hairs were black, and very short. The other on the back and belly was of a somewhat livid colour, spotted with a disagreeable yellow; but the mouth was a little reddish, the eyes black, and the hair grey. It is found on decayed trees, between the wood and the bark; as also among stones that are covered with moss. They all, when touched, contract or roll themselves up like a ball. They are not venomous, as is generally supposed, for they have been handled and irritated.

There is another sort that is very small, and is usually found about hollow trees, and stakes fixed in the ground. It is of the colour of brass, and has many feet; when it creeps along, it bends the middle part of its back like a bow, and if it be touched with a cane or stick, it rolls itself up. The body is slender, and some are above three inches long. There is another kind no thicker than a bristle, and of a light dun colour, and yet it has a vast number of small feet, and is near four inches long. It is to be met with among rotten timber and old ruins.

The *shining* GALLY WORM is sometimes to be seen on heaths, and may be discovered by its lustre, like a Glow Worm. These are not only found in

England, but in *Germany*, and there is one much of the same kind in *New Spain*.

The *brown* GALLY WORM has an hundred legs on each side, and grows to the length of two inches; the body is brown, and there runs a double iron grey line along the back, but the legs are of a paler brown. The back is roundish, the belly smooth, and the skin is somewhat glossy; the feelers are short, and consist of five joints. It is found a little below the surface of the earth, in the north of *England*.

The *grey* GALLY WORM is three quarters of an inch long, and has an hundred and twenty feet on each side; its back is roundish, its belly flat, and its colour of a pale grey, only there are two iron grey lines on the back, and every joint of the body is streaked longways. It consists of about sixty joints, and has whitish feet. It is called by *Ray* the Gally Worm, marked with livid and white circles, and is found under large stones, and on old trees.

The *red* GALLY WORM is an inch and a half long, with a very slender body, of a reddish colour. The back is almost flat, and the belly is quite so; but it has yellowish feet, with a red cast, which are seventy on each side. It is called by *Ray* the very slender long Gally Worm.

Linnaeus has only three of these insects, that with seventy feet, that with an hundred and twenty, and that with ninety-six.

The *common* HOG LOUSE is seldom above half an inch long, and a quarter of an inch broad; the colour is of a livid black, especially when found about dunghills, and on the ground; but those that are to be met with under tiles, and in drier places, are of the colour of the hair of an Afs. It has fourteen feet, seven on each side, and they have only one joint each, which is scarcely perceivable. It has two short feelers, and the body is of an oval shape. When it is touched, it rolls itself up into a sort of a ball, and the sides near the feet are dentated like a saw. It is often found among rotten timber, and on decayed trees; for which reason it is by some called a Wood Louse. The eggs they lay are white and shining, like seed pearls,

pearls, and are very venomous. In winter they lie hid in the crevices of walls, and all sorts of buildings. When the eggs are first hatched, they appear like a sort of Worms of a whitish colour, and seem scarce able to stir; but they soon feed, and become very brisk. This insect is of great use in medicine, for it is very diuretick and aperient; for which reason it is good in the dropfy, and is often given with success for dulness of sight.

The *water* MILLEPEDES is about half an inch in length, and nearly a quarter broad; the colour is a pale brownish grey, and the whole body is so thin that it seems almost transparent. It consists of seven joints, besides the head and tail, and that at the tail is roundish, a little flat, and larger than any of the rest. The tail is forked, and each fork is divided into two parts at the end; the legs are slender, pretty long, of a pale brown, and transparent, being seven in number on each side; the feelers consist of three joints each, and this insect is common in ponds and ditches.

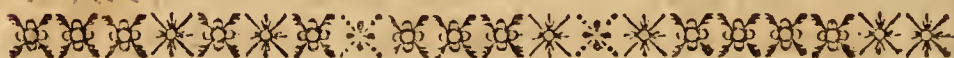
The *greater livid* MILLEPEDES is half an inch long, and of an oval shape. It is livid all over, except at the edges of the segments, which are whitish, and on each side there is a whitish spot near the hinder legs; its skin is tough and glossy; its legs are short, and its tail blunt, being without any division.

The *sea* MILLEPEDES is an inch long, and half an inch broad; it is of a whitish colour, with a roundish back, a flat belly, and sharp sides. The legs are seven on each side, and the three pair before are small and smooth, but those behind large, pretty long, and hairy on the sides. It has two pair of feelers, and the body consists of seven joints, besides the head and tail, which last is three quarters of an inch long, and somewhat of a triangular shape, being marked with two convex parallel rays on each side.

In the *West-Indies* there is an insect, which the *French* call *Poux de bois*, that is, Wood Lice, though they perhaps may be placed more properly among the Ants; for they only have their name from gnawing and eating holes in the wood that they fix upon. They are of a whitish colour, and are supposed to be a very

great delicacy, because all sorts of small birds, domestick fowls, and little Lizards, are very fond of them. They build in the earth a sort of small galleries or roads, a little larger than the barrel of a quill, in which there are so many turnings and windings, that at length the whole building makes a hillock as large as a kilderkin.

Within this habitation there is a sort of little republick, where they are secure from all the attacks of their enemies. If any breach is made in their walls, they immediately all set to work, to repair the damage as soon as they can, and it is a great pleasure to behold them so busily employed about it. The roads may be easily spoiled, by pouring oil of a Sea-cow thereinto, or even sprinkling it upon their whole building; for this will cause them to forsake their habitation. As soon as these insects grow old, they begin to have wings like Ants, when they make their place of abode in those large hillocks of earth, which then become black, dry up, and burn like a candle. Some call them Negroes heads, because they are round, and seem to be curled like a Negro's head. Some surgeons make use of this earth in the cure of dropsies, making the patient sweat, by means of the smoke that proceeds from it. The savages use it for baking their earthen pots, by placing them in it, and covering them with it on all sides; after which they set it on fire, and though it burns but slowly, it will bake them as well as if they were put in an oven.



C H A P. XV.

Of FLEAS, LICE, and other Insects

THE ELEA is so well known, that it hardly needs any description; however, it may be observed, that it has a roundish body, blunt at the end, and a small head, with large eyes; the feelers are short, and are composed of four joints. When seen through a microscope, it appears to be all over adorned with a suit of curiously polished sable armour,
neatly

neatly jointed, and beset with multitudes of sharp pins, almost like Porcupine's quills. The head on each side is beautified with a quick, round, black eye, and it has six legs, the joints of which are so adapted, that it can, as it were, fold them up one within another, and when it leaps, they all spring out at once, whereby it exerts its whole strength. Between the feelers there is a small probe or snout, and there are two jaws or nippers, somewhat like those of an Ant.

The young FLEAS are first a sort of nits or eggs, which are round and smooth, and from these proceed white worms, of a shining pearl colour. In a fortnight's time they come to a tolerable size, and are very lively and active; but if they are touched at this time, they roll themselves up into a sort of ball. Soon after this, they begin to creep like Silk Worms that have no legs, and then they hide themselves as much as possible, spinning a silken thread from their mouths, wherewith they form for themselves a small round bag or case, as white within as writing paper, but dirty without. In this they continue for a fortnight, after which the insect bursts out, transformed into a perfect Flea.

The LOUSE, when viewed with a microscope, is an insect of a very odd shape, with a prominent head, and two black shining goggle-eyes, looking backwards, and placed where the ears stand in other animals, having several small hairs round them. It has two horns where the eyes of most insects are usually seated, each of which consists of four joints, which are strung as it were with small bristles. The head is very round and tapering, terminating in a very sharp snout or trunk, which has a hole, through which it sucks the blood. It has six legs, covered with very transparent shells, and jointed exactly like those of crabs, each being divided into six parts by these joints, and having here and there several small hairs. At the end of each leg there are two claws, by which it is enabled to lay hold of the hairs on which it climbs. The belly is also covered with a transparent substance,
and

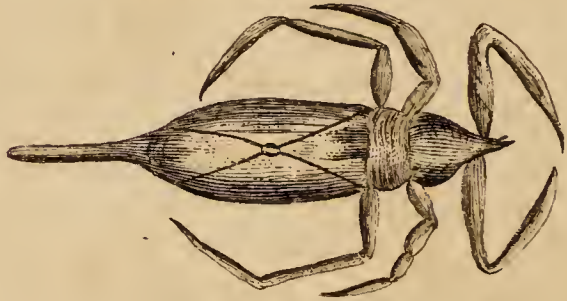
and is grained all over, just like the skin of a man's hand.

Some have affirmed, that a LOUSE will not live within the torrid zone, but this is a great mistake; for the Negroes that live in that climate, though they are almost naked, are generally full of them. One reason of which may be for want of combing their woolly hair, which cannot easily be done, it being so entangled together. Those in the *West-Indies* make use of a sort of oil, with which they kill them; for otherwise they would be almost eaten up alive. However, the white inhabitants in those parts are not much troubled with them, on account of their changing their linen frequently; besides, it is thought their plentiful sweats kill them.

The CRAB LOUSE is so called, for having some resemblance to the shape of a crab. It has a shorter and a thinner body than the common sort. They seem to be generated in the pubes of those that are troubled therewith.

Besides these insects that infest men, most animals are said to have a peculiar sort; only the Fleas are common to many other creatures, particularly Dogs. However, it is affirmed by many, that Asses are never troubled with either of these sort of animals, which, as some superstitious people pretend, is owing to the riding of Christ upon an Ass; but others with more reason affirm, it is because that animal seldom or never sweats. However, they are both mistaken; because these vermin are not generated by sweat, as the ancients supposed, but proceed from eggs, which we call Nits, like other insects.

The Lion is said to be mightily infested with a sort of Lice in the hair over his eyes, and, as is pretended, they plague him so much, that they sometimes make him run mad. Horses are well known to be troubled with vermin of this kind, which have red heads, and the rest of the body whitish. Those of Oxen and Calves are black, and may be seen in great numbers on those that are lean. They are almost like the Lice of Hogs, only they are shorter, and a little thicker. Those of Hogs are so large and hard, that they can hardly

Water Insect.*Two Water Pulices.**Water Insect.**Horse Leech.**Timber Worm.*

hardly be killed with the fingers. Dogs have some of these kind of animals, though very seldom; they look like nits, with a whitish head; but the rest of the body is of a blueish black; they have been particularly taken notice of in Lap-dogs. The Lice of Sheep are very small, and have red heads, with whitish bodies; those of Goats differ very little from these. The Deer, when they have shed their horns, are troubled with great itching in the eye-brows, which proceeds from Lice of the same colour as the head.

The DEATH-WATCH has an oblong flattish body, of a pale brownish white colour, with an annular brown mark thereon, and a brown spot behind towards the vent. The head is oblong, the eyes are large and yellow, and the feelers as long as the whole body. The size is about that of a common Louse, and there are spots all down the sides, of a reddish colour, that is, one on every segment of the body. It has its name from the ticking it makes, resembling that of a watch, which some superstitious people have thought to have been a forerunner of death.

The MONOCULUS, or *one-eyed insect*, is proper to watery places, and has the legs or feet before divided into branches, with which it either swims or leaps, and the body is covered with a crust or shell. It has but one eye, or more properly three, that are placed close together.

The *crustaceous water insect* is very small, and is sometimes of a brownish, and sometimes of a reddish colour. The body is nearly oval, only it is smaller towards the tail, which is long, slender, and forked at the end; and under it, on each side, there is frequently a large cluster of eggs, covered with a skin, of a yellowish colour, and often as large as the insect itself. It has two pair of feelers, and the eye is large, black, and placed in the very middle of the head. It is common in ditches, and other standing waters.

The *testaceous water insect* is covered with a shell of an oblong oval shape, and of a dusky brown colour. When it is taken out of the water, it shuts the shell close up, and resembles the seed of some plant; but when it is put into the water again, it opens like shell-fish,

fish, of the bivalved kind. The feelers appear from one end of the opening, and the legs from the other; the eye is large and black, and its motion is very swift. It is common in ditches and other standing waters.

The *arboreſcent water FLEA* of *Swammerdam* is of a blood-red colour, and ſometimes theſe are ſeen in ſuch multitudes on the ſurface of ſtanding waters, as to make them appear all over red; whence many fanciful people have thought, that the water has been turned into blood, and prognosticated ſome terrible miſfortune. It has ſemicircular feelers, and a crooked tail.

The *water inſect* of *Frych* is without feet, and has a forked tail, like two bristles. Beſides theſe, there are the ſhort water inſect, with ſemicircular horns, and a flat back. The long-bodied water inſect. The ſmall-eyed water inſect; and the ſhort water inſect, with a tail cloven into ſeveral parts.

The *SHEEP-TICK* is a ſmall inſect, which is common at the beginning of the ſummer in paſture grounds. It has a very compressed ſmooth body, covered with a tough ſkin, and is of a ſquariſh ſhape. The colour is of a ſhining black, or of a blackiſh brown. When it fixes its head in the ſkin of any animal, and particularly ſheep, it ſucks out the blood, upon which it ſwells, and grows large and round in a very ſhort time. Sometimes it ſucks the blood of men, and cannot be got out of the ſkin without difficulty. It has ſix feet fixed to the neck, and a ſhort but very ſharp ſnout. It is an inſect well known to country-people.

Mouſet informs us, that ſome have miſtaken it for the Sheep Louſe, from which it is greatly different; for this has a longer ſnout, and the body is never ſo ſwelled with blood, as that of the Sheep Tick, but is always flat; beſides, the feet are of a dark reddiſh colour, and the back of an aſh colour, marked with three exceeding ſmall blackiſh points, and its ſhape is like that of a heart. It never thruſts its head into the ſkin, though it ſucks out the blood by fits, and its excrements tinge the wool with a greeniſh colour, which

is so lasting, that it can hardly be got out by washing it with soap. They will live in a fleece, after it is sheared, for a year together, which is a certain sign that it can live without blood.

The CHEGOE, called by the *French* CHIQUE, and by the *Spaniards* NIGAS, is a very small black animal, which is met with in all places where there are ashes, and where they live nastily. It will penetrate pretty easily through thin stockings, and generally fixes under the toe nails, and the most prominent parts of the skin. The pain that it causes when it first enters is like the bite of a Flea; and after it is once got in, it eats into the flesh so gently, that it causes no more at first than a slight itching; it becomes bigger by degrees, till at length it is of the size of a large pea, and then it produces Nitts, which lodge about the old one, and increase in the same manner, if care is not taken to get them out; and then they cause putrefaction of the flesh round about them, producing malignant ulcers, and sometimes a gangrene.

These insects not only attack men, but Monkeys, Dogs, and Cats. The best way to prevent them from entering the skin, is to wear good stockings, and to wash the feet often, particularly with sea-water.

There is an insect in the valleys of the province of *Popayan* in *South America*, which, though not particularly described, is proper to be taken notice of, on account of its dangerous effects. It is called *Coyba*, and is of a fiery red colour; its size does not exceed that of a middling Bug, and it is commonly found under stones, and among the grass. When this insect is crushed, or burst upon the skin of any animal, its venomous juices enter the pores, mix with the blood, and immediately produce a very dangerous swelling, the consequence of which, if no proper remedy be applied, is certain death.

The native *Americans* take the dried stems of a particular herb that grows in these vallies, setting them on fire, and singeing the patient all over, as soon as the body begins to swell. However, if this insect be crushed in the palms of the hands, no bad effect will follow, which
perhaps

perhaps may be owing to the thickness of the skin. Instinct teaches the cattle, that feed in these vallies, always to blow strongly upon the grass before they eat it; and yet notwithstanding this precaution, the Mules sometimes happen to eat them, the consequence of which is always a swelling, and immediate death.

At *Martinico* there is another red insect, which is very small, and is generally met with in the savannahs or meadows, which are not very wet. They are no larger than a pin's point, and appear as red as fire. They get through the stockings, and fix themselves to the skin, where they cause a dreadful itching. Horses, and other animals that graze in these pastures, have sometimes their head quite covered over with them, and then they rub them against stones and trees so roughly, that one would think they would tear their skins to pieces. To cure them, the inhabitants make baths with odoriferous herbs, wherewith they wash the legs and feet.

The *cheese* MITE has a roundish oval body, with a whitish smooth skin, and a small head. The legs, and parts about the mouth are a little brownish, and much harder than the body, on which there are hairs.

The LOUSE of the Beetle is a very minute insect, with a reddish round body, covered with a firm hard skin; the head is very small, but the legs are pretty long, and the pair before are longer than the rest. It runs very swiftly for its size, and may be frequently seen on the bodies of Beetles, particularly the black Beetle, and other large insects. It is called by *Lister*, the yellowish Louse that infests Beetles.

The *scarlet-tree* MITE has a roundish body, and smooth shining glossy skin, which seems so swelled, as to be ready to burst; it is of a bright red colour, and has a very small head, with short legs. It is marked on each side with a small dusky spot near the breast, and there are few hairs scattered over the different parts of the body. It may be frequently seen on currant bushes, running over the fruit.

The *stone* MITE is of a bright red colour, with a round swelled body, and a small pointed head; the legs are pretty long, and of a paler red than the body;
the

the feelers are much longer than in any insect of this kind. It is common upon old stone walls and rocks, and runs very briskly.

The *scarlet water* MITE has a body of an oval shape, and a depressed back; it is of a bright strong scarlet colour, and has a small head; but the legs are pretty long, and are of a paler red than the body. It is common in small swift currents, where it runs very nimbly at the bottom. It is called by some the small red water Spider.

The *itch* MITE has an oval lobated body, and a small pointed head; it is of a whitish colour, and has two semicircular dusky lines at the back, but the legs are short and brownish. It has been sometimes found in the pustules of the itch, but is not the cause of it, as some imagine, for then it might be always seen therein.

The *Scorpion* MITE has a roundish inflated body, of a whitish colour, and is covered with a thin smooth skin; the head is very small, and of a dusky colour towards the mouth; but it is most remarkable for having claws like those of a Scorpion. It is not uncommon in old rotten wood, and is called by some the Scorpion Spider.

Linnaeus has twenty-six sorts, which are as follow.

1. The ACARUS, *with very long legs*, which is called by *Moufet* the long-legged Spider, and by *Ray* and others, the ash-coloured crested Spider. This has been taken notice of among the Spiders.

2. The ACARUS, *with nippers like Crabs*, has the fore legs made like those of a Crab or Scorpion, for which reason it is by some called the Scorpion Spider. This has been just mentioned.

3. The ACARUS, *with the fore feet very long*, runs very nimbly, and is of the size of a Nit, and of the colour of wax. It has a long body and pale legs, and is found on champignons.

4. The ACARUS, *with the second pair of legs very thick*, is always seen in large companies on the ground, particularly in gardens. It is not so large as a Louse, is of a chestnut-colour, and armed with four exceeding small teeth.

5. The

5. The ACARUS, *that has the third pair of feet largest*, is called by some the Bird Flea, which is mentioned elsewhere.

6. The *red* ACARUS, *with the fore feet the longest, and the hind part of the belly forked*, has two, as it were, small horns near the lower belly.

7. The *sheep* ACARUS is of different colours, and spoils the fleeces of that animal.

8. The *subcutaneous human* ACARUS is the Chegoe before taken notice of.

9. The ACARUS, *with a livid belly, of a fallow colour, oval before, and with feelers like clubs*, is called by authors the Dog Louse, and has a black round spot at the base of the lower body. The breast is scarcely visible, and the head is black, very small, with a forked mouth, and the feet are black.

10. The *meal* ACARUS, is nothing else but the Cheese Mite before mentioned.

11. The ACARUS of *vervain mallows* is so very small, that it can scarcely be seen without the assistance of a microscope, and is of the colour of water with black sides.

12. The *depressed ash-coloured* ACARUS, *with rough sides*, is very common in the beginning of the spring; but at other times it retires into the earth, and is a very small insect.

13. The *red* ACARUS of *insects*, *with a whitish vent*, is the same that infests insects, and has been described elsewhere.

14. The *red water* ACARUS, *with a depressed belly*, is by some called the red little water Spider. It is often seen on lakes, lives intirely on the water, and runs very swiftly.

15. The *red earth* ACARUS, *with a depressed belly*, is by Ray called the red small Spider, and by Petiver the small red *English* Spider.

16. The *red tree* ACARUS, *with sides of a darker colour*, is found on trees, runs very swiftly, and is very common.

17. The *red willow* ACARUS, *with a fallow coloured back*, runs very nimbly.

18. The

18. The ACARUS of the small willow can hardly be seen without the help of a microscope. It is of a saffron colour, and the breast is marked with a red point.

19. The red rock ACARUS, with feelers longer than the snout, is commonly found among stones.

20. The dark red ACARUS, with blood-coloured feet, is found in the rocks by the sea side.

21. The dusky reddish ACARUS, with a roundish abdomen, is found in great numbers at the bottom of the roots of champignons.

22. The reddish fly ACARUS, with long feet like threads, feeds on Gnats and other insects, and its hinder legs are very long and slender.

23. The red ACARUS, with naked wings, and an equal number of scarlet points on each side, lives on Gnats and other insects.

24. The black ACARUS, with globous knees, is met with on the branches of dead trees.

25. The black ACARUS, with sharp sides covered with the cases of wings, is scarce so big as a poppy seed, and hides itself among stones.

26. The greenish white ACARUS of the lime tree is to be met with under the leaves of that tree in autumn. All these insects have eight legs, with as many joints, and two eyes.

Linnaeus also takes notice of another ACARUS, that is hardly visible without the help of a microscope, and which is found on Chaffinches. It has a head like a cone, with the point cut off, and on its hinder part there is a segment almost separate from the rest of the body, to which belong two small crooked portions, and under it is a longish brown spot. It has eight feet, consisting of different segments, and at the extremity of the fore feet there are four clear visicles or bladders, which become flat when this insect treads upon any thing; these are connected to a small long part, which seems not to belong to the leg, just where there are two strong prickles, which are supposed to enable this insect to adhere to whatever it treads upon. The two hinder feet are like those before, only the two prickles are wanting; but the feet, that lie between the second and

and fourth pairs, are the most singular; for they are thick and shapeless, and have at their extremities, instead of vesicles, two saws, one of which is very short. The insect can move them, but not so nimbly as the rest, and therefore it does not use them for walking, but drags them after it like two tails. They seem to be designed to keep it close to the feathers of birds. Several parts are hairy, and the hairs through the microscope seem to be long and stiff, and of a whitish brown colour.

Linnaeus has another kind of small insect, which he calls *PODURA*, and the *French* PUCERON; in general they have a short roundish body, with a crooked forked tail, which assists its leaping, or rather it is entirely for that use, for it only walks with its legs, which are six in number. It has two eyes, each of which consist of eight others. *Linnaeus* has only four sorts, the water Puceron, the snow Puceron, the grove Puceron, and the dung Puceron.

The *common* PUCERON is of the size of a Flea, and of a bright green, or blueish green colour. The body is nearly oval, and is largest and most convex on the hinder part; the breast is very small, and the head is blunt and green. The eyes may be seen very plainly, they being prominent on the fore part of the head, and of a shining black colour; near to these is a black line on each side; the legs are very slender, and are all of the same length, and of a whitish green, but the feelers are crooked. Some call it the green Flea of plants. It is frequently seen on the stalks of orache.

The *toad-stool* PUCERON is of the size of a small grain of wheat, and has a short roundish body, covered with a black glossy skin, and the vent is remarkably protuberant. The head is small, as well as the eyes, but the feelers are as long as the body, and black, with white ends.

The *currant* PUCERON is somewhat larger than a Flea, with a body of an oval shape, and a small head, furnished with little bright eyes. The legs are very slender, and the feelers long. It is of a grey colour, variegated with black lines and spots.

The

The PUCERON, *with white legs*, has a roundish body, of a deep black colour, with a small head, and eyes that are scarce discernable; the legs are short, slender, and white, as well as the forked tail. It is common in woods, about old beech trees.

The *water* PUCERON is of the size of a small Flea, which it resembles in colour, being black and glossy, with a purplish tinge. The body is roundish, the head small, the eyes very little, and the feelers short; but the legs are longer than in most of this kind. It is common in ponds, and other standing waters, and in calm days of the autumnal season the surface is almost covered over with them.

Frysch observes, that the insect, which the *French* call PUCERON, is by the *Germans* named MEEL-TAU, which is much as to say Moth-dew; but he thinks they may be more properly called Blat Læuce, that is, a leaf Louse. They all bring forth their young alive, and the foetus, when it is ready to be brought forth, entirely fills the belly of the female, and its fore parts are excluded first, then the hinder. The foetus does not begin to move till the horns or feelers appear out of the body of the old one; and by their motion it first shews signs of life, by moving them every way, and bending all their joints. Then they begin to stir their two fore feet, as being most active, next to the horns; after this the middle feet, and then those behind. The female lets the foetus stick to her hanging in the air, till its small and soft members become harder; but as soon as she finds that it has sufficient strength, she moves from the place where she was sitting, and as it were forces the foetus to stand upon its legs, and then she leaves it.

The weaker the leaves and buds of plants are, that is, the less juice they contain, the fuller they always are of these kinds of Lice, insomuch that they are often quite covered with them. But they are not the causes of the weakness of the plant, but the sign; though it is true, that by pricking and sucking it, they encrease the disease, especially of that leaf or bud whereon they sit.

As these insects are viviporous, they must necessarily lurk somewhere in the winter, where their bodies may be defended from the cold ; but this is always near the trees or plants that serve to nourish them in the beginning of the spring ; for they are constantly found thereon, as soon as the leaves and buds begin to open. However, they do not hide themselves in the earth, like many other insects ; because they have no part of their bodies fitted to remove the earth, nor are their feet so short, as to suffer them to creep into any chink ; besides, their bodies are so tender, that the least rough particle of earth would hurt them ; nor yet is there any thing else which is common to other insects, that can enable them to conceal themselves in the earth. Hence it is plain, that they get into the deep chinks of the bark, and into the cavities of the stronger stalks, from whence they fall out upon the branches of leaves, when the warmth of the sun begins to be felt. Neither the cold of the autumnal season, nor the lesser degree of heat in *October* or *March*, ever hurts them ; for which reason they do not seek for hiding places before the fall of the leaves, by whose juice these Lice are nourished ; however, some hide themselves sooner, and some later.

They cast their skins, like many other insects, four several times, and the males have wings, but the females have none. They have long legs, not only that they may be enabled to creep over the long hairs of plants and leaves, but that they may travel from tree to tree, that stand at a distance from each other. Their feelers consist of six joints, of which that at the extremity is roundest, and they have a very fine sense of feeling. The trunk or snout, which lies under the breast, they thrust into the pores of the plant, to suck out the juice ; for they do not gnaw them, but so hurt them by sucking, that the leaves become spotted, and as it were overrun with scabs ; for which reason their edges always turn up towards the middle.

The breast is covered with a sort of a square tick, so hard, as to resist the friction of the body against any thing when they creep. The two forward feet are placed before the horny Tick, near the neck, and
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the four hinder behind it. On the last section of the body, except one, there are soft horns on each side, which are sharper in some kinds, and blunter in others; but they do not move these like the feelers, and yet they have a fine sense of feeling, as may be easily known by touching them in the gentlest manner.

It has been said, that these insects are often carried off, and devoured by Ants; but this *Frysch* could never observe. The Ants indeed are fond of those trees where there is a great number of these insects; but then it is only to suck the juice which flows from the leaves that have been lately bored, and this more particularly in the heat of the summer, when other moisture is wanting; but they never hurt or carry away any of these insects while they are alive, nor yet are they able; for when they find any Ants coming behind them, they will kick them away with their hinder feet.

The males have four wings, of which the uppermost are the largest, and those below least; the stripes made by the veins or nerves are the same in all kinds of *Pucerons*, only there is some difference in the angles of their extreme parts. However, there is one kind to be excepted, which leaps like a Flea, and this is not what the *French* call a *Puceron*; for they differ from them in the stripes of the wings, as well as in the mouth. But these insects differ from each other in their colour, which perhaps is owing to the quality of the juice of the trees and plants by which they are nourished. Those that feed upon pot herbs and plumb trees are of an ash-colour, only they are greenish when they are young. Those that belong to the alder and cherry tree are black, as also those upon beans, and some other herbs. Those on the leaves of apples and rose trees are white; but, as they leap like Grasshoppers, they are not properly placed among the *Pucerons*. The most uncommon colour is reddish, and *Pucerons* of this sort may be found on the leaves of tansey; their juice, when rubbed in the hands, tinges them with no disagreeable red. This may furnish a hint to the more skilful physicians and botanists, for a farther examination; for it is very

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certain, that observations of this kind may point out the way to useful discoveries.

The three principal and constant enemies to these insects, are first a sort of Fly, whose shape may be known from most authors, who have given an account of insects, and some have taken notice of their changes ; however, there is in none a very exact description of their nature. This Fly lays its eggs upon the leaves, where the Pucerons are in the greatest number ; there is generally only one at a time, that produces a worm, which with its sharp mouth seizes upon the Pucerons that lie next it, and holding them up, sucks their bellies, and afterwards devours them. The next enemy is a sort of worm, which, though taken notice of by authors, has not been fully described : this devours the Puceron, not only while it continues to be a worm that has an oblong brown body, marked with red spots, and six creeping feet, but after it is turned to a small roundish Beetle, of no unpleasant colour. There are a great number of this sort, which differ in the colour, the situation, and the number of the spots upon the wings. The third enemy is the Ichneumon Wasp, which is of a small size. This gets into the middle of the Pucerons, and with its horns seeks for one of the plumpest of the females, and lays an egg upon her, from which a worm proceeds, that enters into the body of the Puceron through a pore. This done, the Puceron seems to adhere more strongly to the leaf with its claws, and so continues till the worm grows within its body, consumes all the juice, and so kills it. The colour of the skin is then changed into the whiteness of a pearl, to the shape of which the swelling body is not unlike ; it then becomes harder, and defends the ichneumon worm against the injuries of the Ant. After seven days, the worm begins to creep ; and this generation is performed twice every year.

The other kinds of the PODURA are, 1. That with feelers, consisting of numerous joints. 2. The short horned Podura. 3. The round bodied bright Podura. 4. The long bodied larger Podura. 5. The downy Podura. 6. The long legged Podura. 7. The lead

lead colour Podura. 8. The small black legged Podura. 9. The very small white Podura. 10. The short bodied blue Podura. 11. The dusky greyish Podura. 12. The short tailed Podura. 13. The spreading tailed Podura. 14. The large headed Podura. 15. The long Podura with slender legs. 16. The slender horned Podura. 17. The larger water Podura. 18. The long bodied blueish water Podura. 19. The subterranean Podura. Part of these are to be met with on the branches of various bushes and plants, and the other part in ditches and ponds.



C H A P. XVI.

Of WORMS with naked bodies, without limbs.

THE Guiney WORM is so called, because it was first more generally taken notice of in that part of *Africa*, though it was mentioned long before, that is, by *Jenkinson*, in the year 1557, in his voyage to *Boghar* or *Bucharica*. He says, there is a little river running through the midst of *Boghar*, whose water is so unwholesome, that it breeds worms between the skin and flesh of the legs, of an ell long. The surgeons in those parts take them out with great dexterity; for, when the worm first begins to shew its head, they pull it gently out a little way, that is, about an inch, and roll it up; the next day it will come out as much farther, and so on, till it comes quite out. But it does not kill the person when it breaks, at least not always, though he affirms the contrary; for they have been often seen to break in *Africa*, in drawing them out, and yet the patients have not died. It is about the thickness of the large string of a violin, and sometimes much thicker, and the colour is white and shining like silver. *Jenkinson* adds, that strangers are most pestered with these worms; but this is not true in *Guiney*, for many negroes are afflicted with them, while the white men generally escape. The manner of taking them out, in that part of the world, is to wait till the head appears through the skin, after

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which

which they draw it out a little way, making it fast to a stick, about which they wind a small part of it every day, till they have at length entirely brought out the whole, and then the patient is freed from pain. But if the worm happens to break, the negroe is put to a double torture; for it either rots in the body, or breaks out in some other place. Some negroes have nine or ten of them at once, and they are common all over the coast of *Guiney*. Though some of these are an ell long, agreeable to what *Jenkinson* affirms, yet many of them are much longer, growing almost to the length of two ells. This worm is omitted by most of our modern writers; and those that do mention it, give a very erroneous account thereof, affirming that it is no thicker than a horse hair, and of a pale yellowish white all over, except the head and tail, which are black and glossy. The head indeed is of a pretty dark colour, but the tail is of a silvery white, like the rest of the body. It is said that doctor *Lister* has seen many of them alive in the body of a black Beetle; and, in fact, the worm is common enough with us, at the bottoms of lakes, ponds, &c. although it does not enter the skin, as in *Africa*. Dr. *Friend* was the first *English* physician that took notice of it in his history of medicine; but he did not seem to know that *Jenkinson* had mentioned it before. It has also been observed by other travellers that have been in hot countries; and a very circumstantial account is given us of this insect in the *Edinburgh* Transactions, where we are told of one, several ells in length, being extracted, by the preceding method, from the legs of a boy.

The *earth* WORM is of an oblong form. The largest sort are six inches long, and may be stretched to be a foot in length. They are of a reddish flesh colour, and most of them have a ring round the neck, or rather a sort of a necklace, in which there is a little blood. Some of these sort have been seen ten inches long, and above an inch in diameter. This is by some called the lob Worm, and the dew Worm, and is to be met with in gardens and other places, by the assistance of a lanthorn, late in a summer's evening. In great draughts they never appear;
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and therefore, if any of them are wanted as baits for fish, they may be forced out of the earth, by pouring the juice of walnut tree leaves, mixed with a little water and salt, into their holes.

The *Brandling*, *gilt tail*, and *red WORM*, are all to be found in old dung-hills, or the rotten earth that is near them; but the best for fishing are those found in tanners yards, under the heaps of bark, which are thrown out after they have done with it; but the *Brandling* is most easily found in hog's dung*.

The *marsh WORM* is to be met with in marshy places, near the banks of rivers, and is of a blueish colour. The *Tag-tail* is of a pale flesh colour, with a yellow tag on its tail, almost half an inch long. They are to be found in fields that have been manured with marl, and in meadows after a shower of rain. *Mouffet* observes, that Worms in general are of a more whitish colour, after heavy showers of rain. They have the parts of generation belonging to both sexes, and are often seen coming out of the earth to copulate; but they do not wind about each other like Serpents, when they are joined. When a lob Worm has been opened, there has been found a sort of annulated gut, covered with a thin membrane, which had a very strong smell. The eggs lie over the gut near the mouth, and are of a whitish colour. Some suppose that they feed chiefly upon earth, because there is always some found within them when they are opened; however, it is certain, they are fond of crumbs of wheat bread, and will feed upon them greedily when they lie in their way. Many of them are destroyed in very dry summers, and by the cold in winter. They are very often so numerous in gardens, that they do a great deal of mischief; but they may be easily taken and destroyed, in the manner above-mentioned.

The *sea WORM* is above a foot in length, and as thick as a man's finger. It is of a pale red, and com-

* The reader, who is desirous of knowing more of the use of these worms in angling, may consult the Appendix to the third Volume, in which the whole of that art is clearly explained.

posed of rings, or annular joints, like the earth Worm ; but the skin is rough, for all the skin is covered with little prominences. It is found in the mud upon the sea shore, and serves for food to many sorts of fish. The common earth Worms in *Peru* are larger than these, for they are as long as a man's arm, and thicker than the thumb.

The *round* WORM, bred in the intestines of a human body, consists of rings like the earth Worm, it being without feet, and much of the same shape ; but it differs from it in being white. They are not only bred in the guts, but in other parts, and particularly in the heart ; for there are instances of their having been found therein. They have also been met with in the guts of horses, oxen, calves, dogs, hogs, and hawks, besides many other animals, insomuch that it is hard to say, whether any species of animals is free from them or not. They cause various disorders and diseases in human bodies ; for they not only produce pain, but consumptions, convulsions, fevers, and pains like the pleurisy. There is another sort, that have a snout or trunk, with a kind of crooked claws, wherewith they sometimes gnaw and tear the membranes of the stomach, causing inexpressible pain, anxiety, and a stinking breath ; but they more generally reside in the gut called the ileum, because it is free from the gall, for they cannot bear its bitterness. The bellies of children are sometimes strangely distended with them, and they render the excrements like cow dung, and full of substances, like cucumber seed. The round Worms are generally of the length of a palm, or longer ; and yet a certain blacksmith threw one up by vomit, a foot and a half long, with a red smooth head, about the size of a pea, and the body was covered over with a sort of a down, with a tail in the shape of a half-moon. At *Rome*, a man, afflicted with Worms, which gave him inexpressible pain, at length voided one that was black and hairy, of the length of five feet, and about the thickness of a reed. Another brought away one not above a palm in length, which was pretty like the round sort, only the back of it was covered with red hair or down. They have
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been seen of all colours, as red, yellow, black, and variegated with white and black; but of these the green are most uncommon. However, these are all uncommon productions, and never have yet been placed by naturalists in any regular class.

The ASCARIDES are Worms bred in a human body, and some pretend they have seen them in the mud, at the bottom of rivers and ponds. It is of an oblong form, slender, and covered with a very tender soft skin, and are not unlike book Worms. It is of the thickness of a small pin, with a small sharp head, and a pointed tail. There are always a vast number of them together, and they are sometimes voided out of human bodies in large quantities. Their seat is in the great guts, and particularly the rectum. They produce inflammations of the belly, sickness, and leanness, and are attended with great itching of the anus. They are also often bred in the pudenda, in chloretic cases. Some of these Worms are larger than others.

The *tape* WORM grows to a surprising length, being sometimes two or three ells or longer, and it is divided throughout its whole length by knots or joints. Some have formerly thought, that it was the inward skin of the guts, which comes off throughout their whole length; but this is a mistake, for it has been sometimes seen to move after it was voided. It has somewhat the appearance of the links of a chain, the joints being a third of an inch long, and the skin is smooth, and of a whitish colour. It is found in the intestines of many other animals, besides men, not excepting birds and fish. In the year 1725, it was epidemical among the geese in *Germany*; some of them were voided a foot and some inches in length, with the dung, and many of the geese were cured by accidentally feeding upon the remains of sage and hyssop after they were distilled. There have been fish opened, that have not only one tape Worm, but three at a time, and these three times the length of the fish themselves. Mr. *Frysch*, a *German*, who gives us this account, affirms, that these supposed joints are real knots, which he was at the pains to untie, and which,

when done, rendered the Worms a great deal longer. He farther observed, that they had a sort of an artery, which run from the head to the tail, and was plain enough to be seen, it being of the colour of blood, and the body itself white. The breadth of the body grew less and less to the end of the tail, and ended in a sharp point; and the mouth, or fore part, which it could draw in, was formed in such a manner that it appeared to be cut off.

In the bowels of the fish that have tape Worms, there have been found small creeping Worms upon the liver, almost an inch long: they had the same colour and shape as earth Worms. These, when they have been thrown into cold water, have been seen to swell, to grow stiff, and to enlarge themselves, so as to break the skin of the Worm; and then the dead tape Worm has been found to lie at the bottom, thrice the length of the former.

Mr. *Frysch* has been as careful in examining the Worms of a human body, and he affirms, that they consist of three parts, the outermost of which is the skin, and the innermost two guts, one long, and the other short. The skin is thick, and besides the aperture of the mouth, no hole can be found in it. This mouth is most distinct in the lesser sort, and the lips may be plainly seen, by which it adheres to the intestines like a Leech. The greater have a hooked mouth, and somewhat in the shape of a blunt wedge, which is very hard; and with this hook it sticks so close to the inward cuticle of the intestines and pylorus, that a tubercle or callous may be seen in different places thereon. The nearer the Worm is to the stomach, the greater always is the callus, especially in fows, to the middle of which the head of the Worm sticks by its hook, in such a manner, that the descent of the aliment from the stomach, though never so plentiful, could not force it off. The tail or lower part of the Worm is solid, for the cavity of the belly is not continued to the extremity. It has no vent, or one so small, that the excrements could not be forced out by pressing the body; but from the mouth it will void, when touched gently, a sort of a watery liquor, that

that is found in the belly, where there is any space between the two guts, especially between the navel and the mouth. He calls a sort of ligament the navel, which is the sixth part of the body in length from the mouth, and keeps the long gut suspended by its middle and fuller part, lest the watery liquor that lies about it should fall into the lower part of the belly, and press the finer parts that are not so full. By this longer gut, which may be likened to a stomach, the Worm is nourished with a pure and white juice, like chyle. The short gut seems designed for the excrements, it being full of matter, that smells like the human faeces; this is black, and has no fold or bending.

These Worms, of the common white kind, he supposes to be transformed into the long tape Worm. When these Worms are ready to undergo their transformation, they are fuller of this white fluid, and appear of a more shining white; but the lesser become more red, and are much of the colour of the skin. This white gut, which is the principal inner part of the Worm, he supposes to be the tape Worm, which receives its nourishment in the skin of the former, till it is come to a proper size, and then it casts its slough, much in the same manner as a Butterfly. The tape Worm is always three times the length of the former Worm, and is of a white colour; and he has often seen these Worms, that have been killed by mercury, voided with the skin broken as above; and what confirms this conjecture is, that those found in fish, when thrown into cold water, which breaks the skin, always produces tape Worms, three times the length of themselves. These Worms, that is, before they are changed, do not seem to have any parts of generation, which are plain and evident in earth Worms.

The *gourd* WORM is two thirds of an inch in length, when full grown, and its breadth is nearly equal to two thirds of its length. The skin is soft and whitish, with a tincture of brown; the shape is flattish, but a little rounded on the back, and it has two rows of eight deep longitudinal furrows. The hinder part of the body is roundish, and at the other extremity it has a large mouth. It is not unlike the

seed of the common gourd, from whence it has its name. It is sometimes met with in the intestines of men, and other animals.

The *common* LEECH is a water insect, having the figure of a large Worm, as long as a man's little finger. The mouth is furnished with three sharp strong teeth, with which it is capable of piercing, not only the skin of a man, but also that of a horse and ox. It has a small head, and a black skin edged with a yellow line on each side, and the belly is a little reddish; it has also some yellowish spots on the back. It produces its young alive, which is only one at a time, in the month of *July*. It is made use of to draw blood, and must be kept in clean water a few days before it is made use of for that purpose. They will suck the blood till they are almost ready to burst, and then fall off; but they will sometimes continue on too long, and then, if a little salt is thrown upon their bodies, they will let go their hold. *Morand*, in the *Memoirs of the Academy of Sciences at Paris*, has accurately described the mouth of a Leech. It consists of five parts; two lips, an hollow for receiving the blood, an instrument to pierce the skin, which is composed of three sharp points, and an oesophagus for swallowing the blood. The Leech will live in oil, which is destructive to most other insects, if only rubbed on their skins. The Leech, if taken out of the oil, and put again into water, casts an extremely thin skin.

The *horse* LEECH is larger than the former, and has a smooth glossy skin, black on the back, spotted with grey. The belly is of the colour of these spots, with a blueish tincture. It is common in ponds and rivers.

The *snail* LEECH is about an inch in length, and of a very flat shape; its skin is smooth and glossy, and of a whitish colour. The back is a little raised, and the sides so thin, that they look as if they had an edge. It is common on stones, and at the bottoms of puddles of water.

The *broad-tailed* LEECH grows to an inch and a half in length, and has a smooth glossy skin, of a
dusky

dusky brown colour. The back is raised into a sort of ridge ; but the belly is flat, and the tail remarkably broad, with which it sticks to stones very strongly. It is common on stones in shallow running waters.

The *black naked* SNAIL is somewhat in the shape of a half cylinder, and is perforated on the side ; it has four feelers, on two of which there seem to be eyes. It is about three inches long, half an inch in diameter, and the head and tail are smaller than the middle ; the back is convex, the belly flat, and the whole body is furrowed and wrinkled very considerably. It is all over of a deep black, except the belly, which is somewhat grey. The feelers are not always visible, for it thrusts them out occasionally, and the body is covered with a sort of slime, somewhat like that of an Eel. It is of both sexes, and can impregnate, and be impregnated at the same time. It is common in woods, and under hedges, and is sometimes seen in cellars, and other cool places, especially in damp weather.

The *reddish* SNAIL is about two inches long, and is smaller in proportion than the black Snail ; its body is covered with a great number of slight furrows or wrinkles, and it is all over of a dusky red, except on the belly, where it is of a light grey. It is covered with a thick slime, and moves along very slowly, always leaving a track behind it, made with the slime, which drives into a thin glossy film.

The *yellow spotted* SNAIL, when full grown, is about an inch and a half long, with a prominent back, a hollowish body, and a small head. All the surface is slightly furrowed or wrinkled, and covered with a slimy juice ; the colour is of a glossy yellow, with a brownish cast, and is all over variegated with greyish spots. It is very uncommon, though it is sometimes seen in the woods of the north of *England*.

Besides these, there are the large grey SNAIL, spotted with a dusky brown ; the little short grey Snail without spots ; the reddish brown Snail with a reddish body ; the small dusky brown furrowed Snail ; the deep chocolate coloured Snail.

C H A P. XVII.

Of Shell S N A I L S.

A Shell SNAIL has a single valved spiral shell, which is very hard, and light at the same time; by the help of this, the animal is defended from all injuries, and can carry its house or lodging with it wherever it pleases. At the beginning of winter it retires into a hole, and then a sort of slime or glew proceeds from its body, which entirely shuts up the mouth of the shell. Under this shelter it passes the winter, like many other insects, without trouble, and without want. When the spring appears, and the warm weather comes on, the snail opens the door of its house, and roves abroad to seek its fortune. It is obliged to move along, and that very slowly, as it always carries its shell upon its back; and being thus obliged to crawl along, if its eyes were placed low on the body, which is dragged on the earth, it could not see the objects it is in search of; at least they would frequently be exposed to dirt and mud; for this reason, nature has provided it with four eyes, which may be likened to telescopes, wherewith it may see what is doing all round it.

Some have imagined these eyes are horns, and yet they are in reality four tubes, with a glass at the ends; but to speak more properly, they are four optick nerves, on each of which is a very beautiful eye; and many imagine this to be the case of Snails without Shells. It not only lifts up its head to look about, but it raises up the optick nerves still higher, with the eyes placed at the ends; for it can lengthen and direct them at pleasure.

However, authors are not wholly agreed about the reality of this, for some think that the two shorter horns are only the organs of smelling. But, be this as it will, the eyes on the other two are very plain to be perceived. One would at first imagine, that any discovery it can make would be of very little service to this insect, since it is without legs; however, instead of these, it has two large musculous membranes or
skins,

skins, which it can contract or lengthen at pleasure. It first wrinkles up the skin before, by which it drags the hinder part after it; then it contracts or wrinkles the skin behind at the same time, extending that before, which being repeated alternately, this animal can crawl along with ease. But perhaps some may think this mechanism is not sufficient for its purpose; for as it has no wings to fly, when it meets with danger, it seems to be exposed to falls from the brinks of precipices, or into the water, and then it would certainly be drowned. However, to remedy this, nature has provided it, very plentifully, with a thick clammy liquor or slime, which will secure it from falls by its glewy quality; nor yet can it be hurt by rain or moisture, because it has an oil that stops up all the pores of the skin. It seems to know the great use this oil is of, for which reason it takes care that the sun should not dry it up, and as for moist places those cannot do it any harm.

Hence it is plain, there is nothing to hinder its going in quest of nourishment; and when it has found any, it has two mouths armed with teeth, with which it sometimes does a great deal of damage to the very best fruits, to the tender buds of plants, and even to leaves, on which the preservation of the fruit depends.

But what is most wonderful in these animals, is, that they are all hermaphrodites, and have at the same time the parts of generation of both sexes, in-somuch that they usually fecundate each other, as was before observed in treating of the naked Snails. They have a sort of courtship, and when that happens, one of them lets fly a sort of a little arrow at the other, which has, as it were, four wings, or rather four edges. This arrow is entirely separated from the Snail that darts it, and it either pricks the other, or falls to the ground, after it has performed its office. The other Snail darts his at the other; but this mock fight is immediately followed with a perfect reconciliation. This dart consists of a substance like horn, and they are always to be met with near them at the time of their conjunction, which happens three times in the year, and in the space of six weeks; each of them,
after

after this, in eighteen days time, goes to deposite its eggs in the earth, where it covers them with a great deal of care.

When the eggs are hatched; and the young Snails appear, they have each of them a shell, which increases with the growth of their bodies; for at first it is of a size proportionable to its small inhabitant. This shell is, as it were, the rudiments of that which is so visible afterwards to the naked eye; but as the body of this insect cannot grow longer, except towards the opening, it is likewise that way that the shell receives its increase. This is done by the substance that is in the animal's own body, which is composed of a sort of glue, and very fine stony particles. These substances pass through a multitude of small canals, and at last reach the pores, which are very evident on the surface of the body. When the animal perceives that all the pores are shut up under the shell, it directs them towards the parts of the body which lie out of the shell, and are quite naked. These sandy particles and glue, transpiring outwardly, then grow thick, and adhere to, and dry on the edges of the shell. It forms at first a simple skin, to which it fixes another, and then a third; and when all these layers are united, they form a substance exactly like the rest of the shell. As this animal increases, and its body is not sufficiently covered, it continues to transpire, and build again in the same manner. This is certainly the method by which it fashions, builds, and repairs its house; for if you take Snails and break their shells, without hurting their bodies, and then put them under glasses, with earth and grass, you will soon perceive that part of their body, which is left quite naked, will be covered with a kind of froth or sweat, which proceeds immediately from the pores. This sweat or froth is soon pushed forward by another underneath, and so on, till it comes to be on a level with the old shell.

That you may be certain that this shell proceeds from the pores, you need only take the film on the inside of an egg-shell, and slide it gently between the body of the Snail, and the extremity of the fracture;
you

you will then find the shell continue in the same state as it was after it was first broken ; and still, to make this more plain, you will find that the substance, which was to repair the shell, will stick to the film, and there form another shell.

The *great garden* SNAIL is the largest of the common sort, it being about three quarters of an inch in height, and as much in diameter, and the body of the shell is rounded. The mouth of the shell is large, and nearly round, but it is in part filled up by the succeeding turn of the shell. The clavicle, or tail, has four turns, and is blunt at the extremity. The colour of the shell is of a dusky brown, except a broad streak which runs along it, following the spiral turn of the shell. Sometimes there are two others more faint, and above and below that in the middle, there run several broad and short oblique lines or clouds, of a different brown. It is almost every where to be met with in the spring, in the gardens and orchards throughout *England*.

The *brown clouded* SNAIL, *with a round body*, was not a native of *England* till very lately, it being originally brought from *France*, as a medicine for a gentleman ; at which time many of them were turned alive into his garden, from whence the adjacent parts have been furnished with them ; that is in the county of *Surry*. It is above an inch in height, and as much in diameter, and the shell is considerably firm and strong. Its colour is of a deep dusky brown, variegated with clouded spots, and oblique streaks, of a paler colour. The body of the shell is rounded, and the mouth nearly round, only a part of it is filled up by the succeeding turn of the shell. The clavicle is high, and has four turns.

The *yellow* SNAIL, *with a round body*, is about three quarters of an inch high, and as much in diameter. The body of the shell is rounded, as in the two former kinds ; but the mouth is more depressed, the clavicle has four turns, and is terminated by a little round button. The shell is considerably thick, and firm, and the general colour is a dusky yellow, only it has a single broad streak, of a deep brown,
follow-

following the spiral turn of the shell, and placed exactly in its middle. It has also some other faint variegations of brown, and the mouth is surrounded with a thick rim of white. It is not very common, but may be met with under hedges in the west of *England*. There are three other sorts of the common large Snail, namely, the brown and white Snail, with a depressed clavicle. The great brown Snail with a few variegations, and a raised clavicle; and the large blueish Snail.

The *plain yellow* SNAIL is of the smaller species, it being no more than half an inch in height, and about as much in diameter. The body of the shell is not so distinct from the clavicle, as in the larger sorts, and yet there may be five turns, which are easily discovered in the whole shell, and the clavicle rises from the rest of the shell, but it has a blunt termination. The mouth is large, and is nearly round, but it is depressed, and is partly filled up by the succeeding turns of the shell. The colour is generally of a plain bright yellow, without variegation, only the lip or verge of the mouth is of a lighter colour than the rest, being sometimes whitish. It is every where to be met with in gardens, orchards, and hedges.

The *yellow* SNAIL has a very beautiful shell, which is nearly half an inch in diameter, and almost as much in height. It consists of five turns, and has a depressed mouth, with a whitish rim or lip. The colour of the shell is yellow, only along all the spiral turns there runs a broad streak, of a deep purplish brown colour. This is also to be met with in gardens, orchards, and hedges.

The *yellow* SNAIL, *with three streaks*, is near half an inch in diameter, and as much high, with a roundish depressed mouth. The shell is composed of five turns, and the clavicle terminates in a button. The general colour is yellow, except the three streaks, which run along the spiral turns of the shell, of a purplish brown colour. The middlemost of these is broad, and the two outermost narrower: this is also common in orchards, gardens, and hedges.

The *yellow* SNAIL, *with four streaks*, is of the same size as the former, has the same number of turns, and likewise a button at the extremity of the clavicle. The mouth is large and roundish, but depressed and encompassed with a thin rim, of a whitish colour. The general colour of the shell is yellow, only there are four narrow streaks or lines, of a purplish colour, that follow the whole spiral turn of the shell, running along the middle thereof. This may be easily met with in fields and gardens.

The *yellowish* SNAIL, *with five lines*, is of the same size with the former, but has a thinner shell, which is very brittle, and the clavicle terminates in a whitish button. The mouth is large and depressed, and is encompassed with a thin whitish lip; the general colour of the shell is a whitish yellow, and according to its spiral turn, there run five streaks or lines to the top of the shell, through the center of each turn. They are not so plain as in the former.

The *flesh coloured* SNAIL is one of the depressed kind, and is near an inch in diameter, and yet no more than the third of an inch high; the shell consists of four spiral turns, and the clavicle, which is very flat, is roundish at the extremity. The mouth is large, roundish, and encompassed with a thin round lip. It is of a faint reddish or flesh colour, and is beautifully radiated with a deep purplish brown. This Snail is common in *Germany*, and it is said to have been seen on the bushes in *Lancashire*.

The *whitish flattened* SNAIL is about three quarters of an inch in diameter, and more than a third of an inch high. It consists only of three spiral turns, and has a roundish depressed mouth, encompassed with a thin rim. The general colour is a pale whitish grey, only it is faintly radiated with lines and clouds of an obscure purplish brown. It is common in *France* and *Germany*, and some say it is to be met with in *Yorkshire*.

The *whitish depressed* SNAIL, *with a dentated mouth*, is about half an inch broad, and in height no more than the third of an inch. It consists of three or four spiral turns, and has a flat clavicle. The mouth

is

is above a quarter of an inch long, and about as much broad, which make the figure nearly roundish. It has a pretty broad lip, of a pearly white, and is slightly dentated on each side. The colour of the whole shell is whitish, without any variegation. It is said to be met with in *Charlton* forest in *Sussex*, and is pretty common in *Italy*.

The *Jamaica ribband* SNAIL is an inch and a half in diameter, and yet is not above half an inch high. The shell consists of three or four spiral turns, the outermost of which is considerably large, and the rest grow gradually smaller, as they approach the center. The clavicle is very little raised, and has a blunt termination. The mouth is roundish, and the general colour of the shell is a pale brown, except a white streak or stripe, that runs according to the spiral turns of the shell, which is of a white colour, and appears somewhat like a ribband.

The *white depressed Jamaica* SNAIL is about an inch and a quarter in diameter, and about the third of an inch high. The shell consists of four evident turns, but the clavicle is very little raised, and it has a blunt termination. The general colour is white, only there is an orange coloured streak runs along all the spiral turns. The mouth is placed transversely, and has a very large and broad lip, deeply dentated on both sides.

Linnaeus divides SNAILS into three kinds, that is, the *earth*, the *marsh*, and the *sea Snails*. Of the earth Snails there are,

1. The SNAIL, *with an oval shell, and five spines*, is called by *Lister* the ash coloured Snail, whose mouth is covered in the winter with a sort of mortar. It is found in gardens, and is eaten by some.

2. The SNAIL, *with a yellow shell, convex on both sides, with a single brown streak, and the lip turned up*, is met with in woods, groves, and bushes.

3. The SNAIL, *with a shell convex on both sides, and a single grey streak, and a turned up lip*, is found in the same places as the former, and differs greatly in colour.

4. The

4. The SNAIL, *with a shell convex on each side, rough, and having five round turns, being perforated underneath, is found on plants and trees.*

5. The SNAIL, *with a shell convex on each side, and four turns of the colour of horn, as also with a brownish streak, is like the former, but smaller, and has a slender black body.*

6. The SNAIL, *with a shell convex on each side, perforated underneath with an acute turn, and an oval transverse mouth, is called by Petiver the English Snail, with a flattish shell, and a small clavicle, sharp at the point.*

7. The SNAIL, *with the shell of a flattish convexity above, quite convex below, perforated with an acute turn, and a mouth in the shape of half a heart, is very uncommon, and is found on craggy mountains.*

8. The SNAIL, *with an oblong transparent shell, with ten turns, and a roundish mouth, in the Upsala Transactions is named the Snail with an oblong blunt shell, with a roundish mouth, and from eight to twelve turns. It is found in moss at the foot of trees.*

9. The SNAIL, *with a transparent shell, with six turns, and nearly of a cylindric blunt shape, or the small Snail with seven turns, is also found at the feet of trees, and on the old thatch of houses.*

10. The SNAIL, *with a yellow transparent shell, a sharp clavicle, and an oblique mouth, is found in the same places as the former.*

11. The SNAIL *with a transparent yellow oval shell, has an oval lanceolated mouth, and a long clavicle.*

Of the *water* SNAILS, there are,

1. The SNAIL, *with a flat brown shell, umbilicated above, and having four turns, is called by Lister the brown Snail, hollow on each side about the clavicle. It is found in rivers, marshes, and ditches.*

2. The SNAIL, *with a flat white shell, hollow on each side, and having five smooth turns, is found in lakes.*

3. The *brown* SNAIL, *flatter on one side than on the other, and four spines on the edge (so called by Lister; but by Linnæus the SNAIL with a brown flat shell, hollow*

hollow above, having four turns, and a prominent margin) is found in all watery places.

4. The SNAIL, *with a flat brown shell, and five turns, having an acute margin*, is called by Lister the small brownish Snail, with the shell flatter on one side than the other, without a margin, and with five turns. It is found in the same places as the former.

5. The SNAIL, *with a flat shell, convex above and hollow underneath, having four turns, and with a margin downwards*, is found in rivers and marshes.

6. The SNAIL, *with a flat shell, equal on both sides, umbilicated, and the mouth in the shape of a half-moon*, is found in ditches, and at the feet of trees.

7. The SNAIL, *with a long shell, opaque, acuminate, having six turns, and an oval mouth*, is called a Trumpet-shell by most authors, and is found in ditches, marshes, rivers, and ponds.

8. The SNAIL, *with a long acuminate transparent shell, having six turns, and an oval oblong mouth*, is nearly of the same shape as the former, and is a kind of Trumpet-shell.

9. The great dark brown SNAIL, *with a streaked shell*, is called by some the Ox-head, and is found in lakes, marshes, and rivers; it is termed by Linnaeus the Snail with a longish blunt shell, having three turns, and three livid lines.

10. The SNAIL, *with an oblong blunt shell, with four loose ash coloured opaque turns, and the mouth a little oval*, is found in the same places as the former.

11. The SNAIL, *with an oblong shell, which is transparent, having five turns, and an oval mouth*, is twice as small as the former, and is found in rivers.

12. The SNAIL, *with a transparent shell, having four turns, and a sharp short clavicle, with an acute mouth*, by all other authors it is named a Trumpet-shell; and Lister terms it the yellowish transparent Trumpet-shell, with four turns, a sharp clavicle, and a very large mouth. It is found in rivers and ponds.

13. The SNAIL, *with a transparent shell, has a large oval mouth, four turns, and a wrinkled surface*.

14. The

14. The SNAIL, *with a membranaceous yellowish oblong shell, with a blunt clavicle, and three turns*, is called by other authors a Trumpet-shell, and is found in lakes and rivers.

15. The *nerite* SNAIL, called by *Lister* the river Nerite, is of a blueish green colour, variegated with spots, and having a reddish cover, in the shape of a half-moon, and beset with prickles.

16. The *lake nerite* SNAIL, so called by *Linnaeus*, is common in the lakes near *Upsal*.

Of the *sea* SNAILS, there are,

1. The *Nerite sea* SNAIL, called by *Lister* the reticulated Nerite, and by *Petiver* the *English* sea common Nerite.

2. The SNAIL, *with a thick oval shell, prominent on each side, and having five furrowed turns, and an undulated lip*, is a sort of Trumpet-shell, and is found in the western ocean.

3. The SNAIL, *with a long sharp shell, having twelve streaked turns*, is termed by *Lister* the streaked thin Trumpet-shell, with twelve turns at least. It is found as the former in the western ocean.

4. The SNAIL, *with a long acuminate shell, and a dilated lip, having a double sinuated streak on the fore part*, is commonly found in the *Atlantic* ocean.

5. The SNAIL, *with a roundish, blunt, umbilicated shell, marked with five round streaks, in the shape of arrows, and the second with undulated lines*, is named by *Lister* the reddish Snail with spotted streaks, especially on the lower turns.

6. The *oblong* SNAIL, *with the shell marked with longitudinal marginated streaks*, is called by *Petiver* the lesser white Trumpet-shell, with ribs curiously raised.

C H A P. XVIII.

A CATALOGUE of *South and North-American Insects.*

IT may not here be improper to give a general account of the insects of our *American* plantations, though many of them have been already mentioned in their proper places; especially as it will be more satisfactory to strangers that happen to be new comers into that country.

In the *West-Indies*, the Ants are very numerous, both in the woods and fields, and do a great deal of mischief, not only to vegetables but animals.

They have likewise various sorts of Bees, Beetles, Bugs, Butterflies, and Caterpillars. Of these, the nightshade Caterpillar is of a very black colour, only the head and sides are spotted with white, and is covered with yellow hair or bristles. When a man touches it with his skin, it will cause it to burn like fire.

Chegoes are insects like Fleas, and frequently get under the nails of the hands and feet, where they cause great itching, swell, and lay their eggs, unless picked out with a needle.

They have likewise Crickets, Earwigs, Flies of various sorts, Gnats, Lice, Locusts, Scorpions, and Spiders; of which last the great hairy Spider is the most remarkable, though common to be met with in these parts; for, notwithstanding it feeds on Flies and other insects, yet, when they are caught and kept in a box, they will live a long time without eating.

BEEES are very numerous in *North-America*, particularly in *Carolina*, not only in hives, but in the planter's gardens, and in several parts of their large woods, where they make their cells in hollow trees, in which are frequently found vast quantities of honey and wax. The planters make their hives with a piece of a hollow tree, especially the sweet gum tree, which they cut into a proper length for that purpose, and lay a board on the top, to shelter the Bees from the rain, sun, and other extremities of the weather. They generally

nerally form their cells very large, which is the reason that they make use of such sort of wood.

The HUMBLE BEES are pretty common here, and do not seem to differ much from those in *Great Britain*, and other parts of *Europe*.

SILK WORMS have been found in the woods of *Carolina*, and seem to be pretty nearly the same as those in other parts of the world. Sometimes great numbers of them have been seen together, and perhaps they are those that the planters have made use of for the establishment of a silk manufactory. The balls of silk, that have been made by them, are as large as an ordinary walnut.

BUTTERFLIES are in great plenty in these parts, some of which are large, and others small; but they are all in general beautifully variegated with a great variety of colours. They lay their eggs in *May*, *June*, and *July*, and doubtless undergo the same changes as those in *Europe*; though travellers have forgot, or perhaps have not observed this material circumstance; some of these Butterflies are larger than any in *Europe*, and are so strong, that they will drive away the Humming Birds from the flowers they have a mind to settle upon. If what a certain physician says is true, they will not only live but fly for above thirty-five days after their heads are off; but this the reader may believe or not, as he pleases.

GRASSHOPPERS are very common, and are chiefly of two sorts; the first of which are much larger than those in *Europe*, and the other are much of the same size; but they are both more lazy and inactive than the *European*, for they are frequently seen groveling in the dust, and are seldom heard to sing. They seem not to be endowed with a very quick sight, for they seldom stir till a man is just ready to tread them under his feet. Instead of a mouth, they have a trunk or tube on their breasts, wherewith they suck in their food, which some suppose to be nothing but dew; however this is improbable. They have also small sharp pipes or tubes on the breast, with which they make a ringing noise, which those not used to them cannot tell what to make of. Their backs are
rough

rough and sharp, and travellers tell us it is with ease they make the holes in the earth, wherein they lay their eggs, which are hatched by the heat of the sun. At first they appear like worms or maggots, that, having undergone the usual changes, turn into Grasshoppers. The males are the only singers of this tribe; for the females are said to be always silent, and neither one nor the other ever appear in the winter season.

The HOG-LICE are of two sorts, and are to be seen almost every where, especially under stones, and among rotten wood. When they are touched they roll themselves up like ours, but at other times they are thin.

The FIRE-FLY is so called, because in the night they shine like Glow Worms, giving a pretty strong light like fire. They are as long as the Drone Bees, but much thicker, and of a brownish colour. They begin to appear in *May*, and continue most part of the summer.

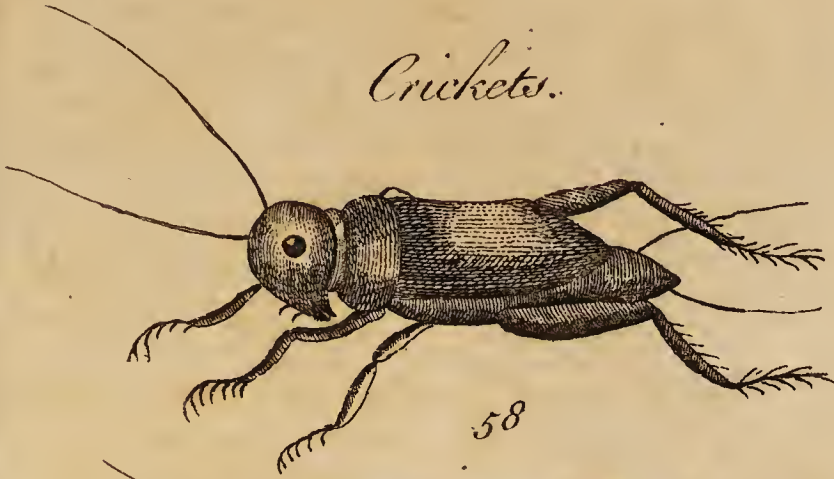
The CRICKETS are winged insects like Grasshoppers or Locusts, and are very common in these parts; but they are not of the house kind; for they are only seen and heard in the woods and corn-fields, in summer, where they sing almost continually. In winter they get into warm places, and sometimes into the houses, where they eat large holes in linen and woollen cloaths; they likewise do a great deal of mischief to corn, and all sorts of grain, of which they are great devourers.

LADY BIRDS are also met with in these parts, being much the same as those in *Europe*, for the uppermost wings are red, spotted with black; when they are reduced to powder, they are of a deep purple colour, and will give a tincture either to water or spirits of wines.

They have also a FLY here like the Cantharides, or *Spanish Flies*, which are to be met with in the summer season. They proceed from small worms, which have the appearance of Caterpillars, that are bred upon fig trees. Whether they have the same qualities or not in raising blisters, is not very certain, though it is supposed they have.

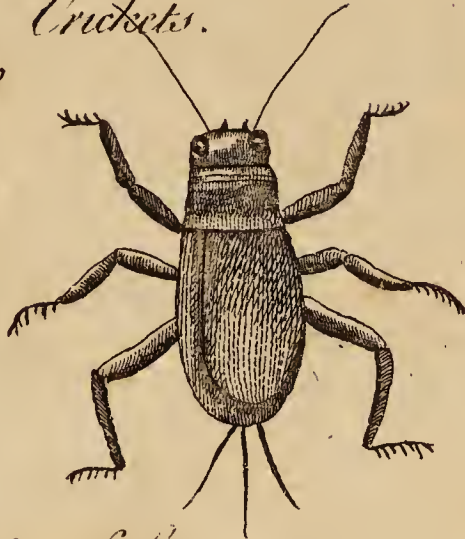
The

Crickets.



Water

Crickets.



Sort of Grasshopper.





The ANT has much the same qualities here as in *Europe*. They lay up their hoards in the summer time, near the full moon, or while it yields a considerable light; but about the new, their labour ceases, as is confidently affirmed, which seems to shew that they stand in need of a considerable light to see what they are about. They wear away the stones, that is, they make tracks or paths in them, by their running so often backwards and forwards, and drawing their burthens along. There is a greater sort that lead the way, and the lesser drag the corn. They are very neat in their habitation, and will not enter them before they have taken off the dirt from their bodies; they also make dams to keep the water out of their nests, and are careful in burying their dead. They likewise throw up the earth over the mouths of their nests, wherein they have three cells, in one of which they live, in another they breed and bury their dead, and in the third they keep their corn. When they are old, they always have wings, but do not continue long in that state, for they die soon after.

There are several sorts of SPIDERS in *North-America*; the most remarkable of which is the mountain Spider, or rather the wood Spider, near the mountains. It is of a very large sort, and exceeding venomous. They are said to make their webs so strong, like those of *Bermudas*, as to catch small birds. Their sting or bite is attended with violent pains at the heart, cold and heat by turns, shortness of breath, tremblings, cold sweats, vomitings, and many other symptoms, which commonly end in death, unless a proper remedy be timely applied. The cure is generally performed, by bathing the wound with a decoction of stinking trefoil and oil, and by fomenting it with sponges dipt in vinegar, not omitting proper cordials. The native *Americans* cure it by sucking the wound with their mouths, repeating it several times, and spitting out the venom.

The EARWIGS seem to be much the same as those in *Europe*, and therefore nothing needs to be said about them.

The *common small black* FLIES are in great plenty, but they are more troublesome here than in *Europe*; for they will fix on a man's stockings, and pierce through them with their trunks or snouts, and cause great pain.

The *large black mackrel* FLIES are also very common, especially in the summer time; but they do not differ from those in *Europe*, which some call by that name.

There are several sorts of *ox* or *gad* FLIES, and of various colours; but most of them are yellow and green, and appear to be most numerous in the months of *July* and *August*, at which time they are very troublesome to horses, attacking their eyes and heads, but no other part.

The WEEVIL, so called in these parts, is a small worm not much bigger than a Mite. It is very destructive to *Indian* corn; for it will get into barrels wherein it is put, and entirely spoil it; which however they do not touch in the open fields, nor indeed any thing else that is exposed to the wind and sun. To prevent this mischief, they spread a little salt at the bottom of the cask, and, when the corn is in, over the top.

They have BUGS here as well as in *Europe*, which are flat and red, and exactly of the same shape and size as Hog Lice. They were very probably brought from *Europe* in the ships, and will get about beds, where they are as troublesome as in *London*.

The *cock* ROACHES here are as large as Crickets, and seem to be a sort of Beetle, of a dark brown colour. They often get into the houses, where they do a great deal of mischief to books and linen.

The TUMBLE-DUNG is a sort of Beetle, and is so called from its rolling of horse-dung from one place to another, till it makes it into balls, of the size of small bullets.

The MUSKETOES, called by the *Americans*, Toquani, are of two sorts, one of which is small, of a dark colour, and very troublesome, especially in savannahs and marshy low grounds; for which reason none can live in such places, except the native
Ameri-

Americans, who perhaps are defended from their bites, by the grease or fat which they every day dawb themselves with; as also by the colours wherewith they paint their bodies. The other sort are of the same shape and size of the former, but their colour is whitish; these are not so troublesome as the former sort, nor are they so apt to bite. They are generally brought to the northern pars of *America* by the southerly winds in *July* and *August*, in prodigious quantities; but they do not stay long, for they either die, or are carried back by contrary winds.

The MUSKETO HAWKS are insects, so called from their continually hunting after Musketoës, which they kill and eat. It is a large Fly, with a long body, large head and wings, resembling a Dragon Fly. They are in great numbers in the latter end of summer, but they seldom appear in the day time, which perhaps is owing to their pursuing Musketoës all the night, which are their natural prey.

The horned BEETLE, BULL-FLY, or STAG-BEETLE, is so called from a large pair of horns on its head, exactly resembling the horns of a deer. They can bring them together as Lobsters do their nippers, and make the same use of them. This is not like the Stag Beetle of *Europe*; for the horns are larger, and of a different make, and their bodies are also much bigger. It is most commonly known to the planters, by the name of the flying Stag. They hang them about children's necks, as a charm, in several diseases; but if they have any virtue at all, it must be from the effluvia which they emit from their bodies.

The sand FLY is so called from its being found in sand banks near the rivers. It is not much bigger than the Ant, but it is as troublesome as a Musketoe, tho' it never molests any other part but the face.

The WASPS of *North America* build their nests in trees, of a substance that resembles cobwebs, or rather thin brown paper. They live upon insects, and will feed upon any sort of flesh, when they can come at it. They do not appear in winter, but lodge in the holes of trees, or in those that are hollow, but they do not live above two years. They are not mischievous,

chievous, for they never sting, unless they are provoked, or when their nests are in danger. However, the planters endeavour to destroy them, by shooting at their nests with gun-powder, or rather with a wad that keeps it down, for this will set them on fire; but then they run away with all the speed they can, as soon as they have shot; however, they very seldom escape without being stung, for the Wasps will pursue them in great numbers, and the sting is a great deal worse than that of the Bees.

The HORNETS, in these parts, build their nests in cavities and holes of the earth, and are made much like the former. This is an evident sign that they are not exactly the same with ours; but what the difference may be, we have no certain account of. It is said, if they are boiled in water, the decoction, when applied to the skin, will make the part swell, as if it was dropical, and yet without pain. As for their sting, it produces a great deal of pain, and some very bad symptoms; but it may be cured with a poultice of cow dung, and taking *Venice* treacle inwardly.

The LABOURERS, so called in these parts, are a kind of Hornets, which have their name from the pains and labour they are at in building their nest with a sort of yellow clay. They make their rooms or cells in these, in a very artificial manner; for they are so hard, when dry, that they are broken with difficulty, when their brood is designed to be taken out. They are almost as big as a Hornet, and are of the same shape and colour, with long legs. They are more mild than the common Hornet, for they seldom or never sting. They are obliged to make holes in the sand by the river sides, and other moist places, which often must be very deep to come at the clay. They will sometimes attempt to build their nests in the cielings of houses; but they are generally prevented, after they have begun to fix their clay thereon.

The *large dog* TICK is remarkable for its burrowing in the skin of several animals, and seems to be much of the same sort as our sheep Tick; but it has no vent,

vent, and therefore when it has sucked the blood till it is quite full, it generally falls off.

The *sea* TICK, or rather the water TICK, is so called, for its being common in marshes near the water side. They are so small, that their bulk is seldom equal to that of a small pin's head; but they are very troublesome to those that travel in the woods, and near the sides of rivers; for they stick so fast in the skin, that it is almost impossible to pull them out; but they may be destroyed, by bathing the part with a decoction of the leaves of tobacco.

Some travellers take notice of a sort of Locust in *North America*; but it may be doubted whether there are any properly so called in these parts or not; at least it is certain, that they are never met with in any great numbers; for no author whatever takes any notice of any mischief done by them, or of their appearing in swarms.

The CATERPILLARS and PALMER-WORMS are as frequent here as in other parts, and undergo the like changes; but as the trees are all different, especially before the *Europeans* had transplanted some from *Europe*, the Caterpillars must be different too, as well as the Fleas and Butterflies that proceed from them; but we have not met with any naturalist that has been curious enough to give us a distinct account thereof.

They have a sort of GALLYWORMS, with a great number of feet of different kinds; for some of them are smooth, and others are hairy all over, about the thickness of a man's little finger, and near two inches in length; however, they are not common, for they have a great many natural enemies, that take care to destroy them.

The *tobacco* WORM, or CATERPILLAR, is so called from its feeding on the leaves of the tobacco plant. It resembles a Gally Worm in shape, but is somewhat larger, and not hairy. It has two sharp horns or feelers on its head, and the body variegated with white and black. It has as many feet as a Gally Worm, of which it seems to be a species. They do a great deal of mischief in the tobacco plantations, unless prevented; and therefore the negroes are em-

ployed by the planters to search for and kill them. They do not seem to be of a venomous nature, from whence they appear to be of the Caterpillar kind. The planters, by way of punishment, will often oblige the negroes to eat them, from whence it is evident, that they are not of a venomous nature, for they never do them any harm. This punishment is inflicted when the negroes have been negligent, and have not taken care to pick them all off the tobacco plants.

There is a sort of a GLOW WORM in *North-America*, which shines like those in *Europe*, and are commonly found in swamps and wet low grounds, where they shine so much, that they may be seen at a great distance.

The *land* WOOD-WORMS are of a shining copper colour, and are about five inches in length, but not quite so thick as a man's little finger. They have their name from their being found in old rotten trees, and their bite is supposed to be venomous.

The TIMBER WORM is so called from its breeding in ships, and other timber, laying in salt water. They have small soft white bodies, and large hard black heads. They are met with of different sizes, some being no thicker than a horse hair, while others are as big as a child's finger. When a ship was brought into fresh water, it was supposed that this would effectually destroy the worms in the bottom; but fatal experience evinces, that there are numbers of these even in our parts at home, and that the fresh water has no effect in destroying them; but when they lie in the mud, or on the sand, they often receive a great deal of damage. Sometimes the planks of ships, when taken off, have appeared to be eaten into cells, like honey-combs, in less than six weeks time.

The *earth* WORMS are like those in *Europe*, and so are the Snails, but these last are not very common; for they have a great number of enemies, that always lie in wait to destroy them.

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